

The  
NEW UNIVERSAL  
ENCYCLOPEDIA

Volume 1



# The NEW UNIVERSAL ENCYCLOPEDIA

*Founder-Editor* Sir John Hammerton

*Revising Editor*  
Gordon Stowell

VOLUME I

A-ARIT

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*Introducing*

## The New Universal Encyclopedia

**I**N the years between the two World Wars the UNIVERSAL ENCYCLOPEDIA in its original form established itself as a standard work of reference, held in high esteem by an extraordinarily large public. Its sales throughout the world were indeed without precedent for a work of this kind and have never been equalled.

As edition succeeded edition the work was so revised as to keep abreast of contemporary events and discoveries. But in face of the violent dislocations of the years 1939-45 and the profound changes they brought, not only in human knowledge and its application but also in the direction of human thought and the assessment of human values, it became clear that no revision or augmentation appreciably less than the making of a *new* encyclopedia could meet the needs of the post-war generation.

**T**HE arduous task of compilation was therefore undertaken anew, though fortunately under the same skilled editorial direction as before. The late Sir John Hammerton possessed not only brilliant gifts of editorship but an exceptionally long experience in the preparation and presentation of popular educational works of all kinds. Those gifts and that experience were now concentrated on the creation of this NEW UNIVERSAL ENCYCLOPEDIA—virtually a new work from first page to last, but zealously retaining all those special characteristics which had served to make its predecessor so widely acceptable.

What are these characteristics? Four of the most important may be noted here.

**T**HE first and most immediately obvious is the high proportion of pictorial material to text. The total number of illustrations is about 25,000 and this gives an average throughout the 15 volumes of 14 illustrations to every five pages. Moreover these illustrations—photographs, drawings, diagrams, maps—really do illustrate, clarifying or supplementing the text in precisely the way the inquirer might wish.

**S**ECONDLY, although the NEW UNIVERSAL, like every other responsible encyclopedia, is offered as a work of scholarship, every contri-

butor writing with authority as an expert in his own subject, yet these contributors have all been actively discouraged from expressing themselves too exclusively in those specialised technical and professional terms with which experts are too often content. Their response is evident in a prevailing clearness and simplicity of statement. Where necessity demands the use of technical terms, these are themselves explained in terms of common speech.

**T**HIRDLY— and here is the characteristic of this work which has aroused more appreciative comment than any—the work is so planned that anyone in search of a particular reference should be able to find it forthwith, in the place where he would expect it to be found, *under its own heading* in its appropriate alphabetical position. The 54,000 entry-headings have been selected, and the entries, long or short, have been written, with the consistent purpose of giving the maximum of information on a given subject in the place where it will most speedily be found. The general editorial principle has

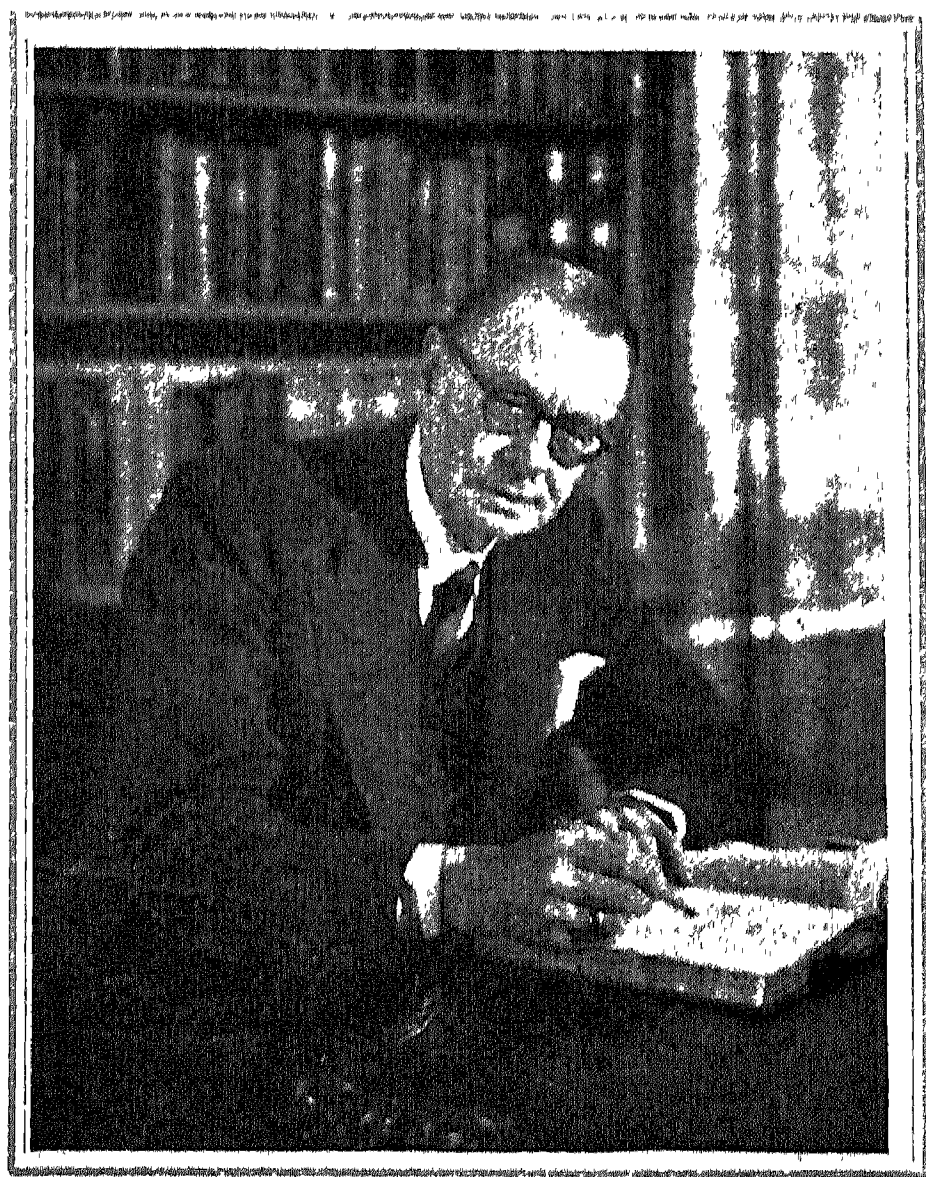


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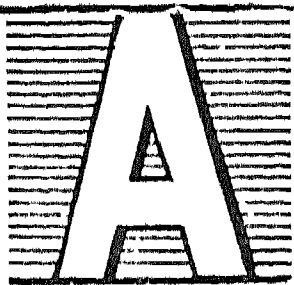
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THE letter A has remained at the head of the alphabet during the whole of the existence of alphabetic writing, *i.e.* for more than 3,500 years. Moreover, symbols of similar shape are found in earlier, non-alphabetic scripts, but their phonetic value is not known. In the North-Semitic alphabet—which, so far as evidence shows, was the earliest fully developed alphabetic writing (*see under Alphabet*)—the letter A was called *aleph* and was rendered by the Semites as . It was not a vowel, but a consonant, its  sound being that of a smooth breathing. It became the vowel *alpha* in the early Greek alphabet, and provides the first part of the modern English word “alphabet.” The earliest existing Greek records in which the *alpha* appears go back to the 8th century B.C., but the alphabet was certainly introduced into Greece much earlier. The Greeks gave the letter symmetry of form (A, α).

The letter A passed from the Greeks to the Etruscans (*see Etruria*) in the 8th century B.C.; and from them (probably in the 7th century B.C.) it passed to the Romans. It is still retained as the form of the capital letter in most modern alphabets. The modern name of A is of Etruscan origin.



Cursive characters were already used in Rome in the 1st and 2nd centuries A.D. In some instances the letter *a* appeared as , the under-loop coming some 200 or 300 years later  in the Unicals (*q.v.*). In ancient times the minuscule, or small letter, did not exist

both the monumental writing and the cursive scripts consisted of the present-day “capitals.” Monumental writing was used for inscriptions on hard material, such as stone, whereas cursive scripts were used for writing on tablets coated with wax, on papyrus, parchment, etc. The blending of the “majuscules” and the “minuscules” into combined service is due mainly to the Caroline hand. The Caroline or Carolingian “minuscule” *a* of the 9th century became the prototype of the Venetian “minuscule” *a*, now called *italic (a)*, and the North-Italian “minuscule,” now called *roman (a)*. These two neat and beautiful forms were introduced, as humanistic or Renaissance hands, in Florence in the 15th century, the former, more cursive, being used mainly for the needs of every-day life, the latter in literature.

The Semitic-Greek-Roman monumental letter (A), to-day’s “capital,” the *italic (a)*, and the *roman (a)* are the main forms now used in print.

**A** First letter and vowel of the English and many other alphabets. Its commonest sounds in English are those heard in *bar, map, bald, name*. In certain words it represents the sounds *e, i, o, a*, as in *many, village, was, about*. It may be doubled, but this is rare, occurring only in names and words of foreign origin, *e.g. Aaron, Baal, Balaam, aard-vark*. Combined with other letters, as in *ae, ai, ao, au, aw, ay*, it represents, in each instance except *aw*, more than one sound. The diphthong *ae*, corresponding to the Greek *ai*, as in *Caesar, aegis*, is generally pronounced *ē*. When followed by another vowel *a* is in some words pronounced as a separate syllable by many speakers, as in *aorta, aorist*. *Ai* and *ay* usually represent the sound *ā*, but may also represent *a, e, ī, ē*, as in *plait, says, aisle, and quay*. *Au* generally represents *aw*, but may represent *ah*, as in *aunt, ā* as in *gauge, o* as in *laurel*.

**A.** In music this is the sixth note in the natural scale of C. In the Middle Ages musical modes were started from most of the notes of the scale represented by the level—now white—keys of the organ, which are whole tones apart, except E–F and B–C, which are semitones. The order of the tones and semitones in the mode which started on C became accepted as the normal or major scale, hence the subordinate position of A in the modern scheme of musical notation.

A, being the pitch of one of the strings of each of the bowed instru-

ments of the modern orchestra, has been chosen for the tuning note. The standard pitch of treble A, recommended at an international conference held in London in 1939, and adopted by the B.S.I., is 440 vibrations a second. The B.B.C. daily broadcasts a note of this frequency.

**A1.** Symbol for first class, derived from the use of the term in Lloyd’s Register of Shipping (*q.v.*), originally to denote the best type of wooden vessel. It was first used about 1775 or 1776. (The exact date is unknown, as the records were destroyed by fire.) “A1 at Lloyd’s” became a qualification internationally recognized and sought after.

**Aa.** Name of numerous small European rivers. Among them are the Swiss Aa, in the cantons of Lucerne and Aargau, draining lakes Baldegg and Hallwyl into the Aar; two rivers which fall into the Gulf of Riga, and the French Aa, between the departments of Nord and Pas-de-Calais, which is canalised for 17 miles, from Gravelines to St. Omer.

**Aachen.** German name of the city entered under its historic French name Aix-la-Chapelle (*q.v.*).

**Aahhotep.** Name of two Egyptian queens. The coffin of Aahhotep I, mother of Aahmes I (c. 1580 B.C.) contained her mummy, with a collection of fine jewelry, including gold and silver boats with crews, and hinged bracelets.

**Aahmes** (Gr. Amasis or Ahmosis). Name of two Egyptian kings. Aahmes I (c. 1580 B.C.) ex-

pelled the Hyksos from Memphis, and founded the XVIIIth dynasty. Aahmes II (568–526 B.C.) rebelled against Apries, the Pharaoh-hophra of Jer. 41, and seized the throne. He contracted alliances with Croesus, king of Lydia, and Polycrates, tyrant of Samos. Herodotus, who draws an amusing portrait of him, says that he took Cyprus (Bk. II).

**Aal** or Aen. Indian dyestuff, prepared from the wood or roots of various species of *Morinda*, chiefly *Morinda citrifolia*, Indian mulberry or togari wood. It is used to dye cloth a dull red colour, the fabric being boiled together with powdered aal, castor-oil seeds, and alkaline earth. The dyed cloth, called *kharna*, is said to be immune to the attacks of white ants, and is used by Indian shopkeepers to wrap up account books.

**Aaland Islands.** Group of some 300 isles and rocks at the entrance to the Gulf of Bothnia, forming the Finnish department of Ahvenanmaa, area 570 sq. m. Only about 80 are inhabited. The largest, Aaland, is 18 m. long. Mariehamn (Finnish Maarianhamina) is the chief town. The people, mainly of Swedish origin, are skilful sailors and fishermen. Hardly cereals and cattle are raised, and meat, hides, cheese, and butter are exported.

In 1809 Sweden, to whom the islands had long belonged, ceded them to Russia, and since then the question of fortifying them, their position being of great strategic importance, has been the subject of frequent dispute. In 1851,

whose original home it was, remain. Aargau was admitted into the Swiss Confederation in 1803; its capital is Aarau. Area 543 sq. m. Pop. (1950) 300,782.

**Aarhus** OR **ÅRHUS**. Seaport and second largest city of Denmark, chief town of a county of the same name, situated on the E. coast of Jutland, where the Aarhus river enters the Kattegat, 56° 9' N., 10° 12' E. The seat of a bishopric from 948, it has a Gothic cathedral (over 100 yards long) founded in 1200. The university, founded 1928, has a large medical faculty. The state library here, opened 1902, is the only big library in Denmark outside the capital. In the open-air museum, called the old town, historically interesting houses have been re-erected and old crafts are demonstrated. Industries include brewing and the manufacture of chemicals, metal goods, textiles, foodstuffs (chocolate, biscuits, margarine), paper, furniture, and tobacco. Aarhus imports coal, oil, fodder, and fertilisers, and exports bacon, eggs, and butter, principally to the U.K. Pop. (1950) 116,167.

**Aaron**. Elder brother of Moses and high priest of Israel. By divine command he acted as spokesman for Moses before the elders of Israel and Pharaoh (Ex. 4 and 7). Eloquent, but of weak character, he yielded to the people when Moses was on Sinai by fashioning the golden calf for worship (Ex. 32), and with his sister Miriam rebelled against his brother (Num. 12). He was made high

priest (Ex. 29 and Lev. 8), and his title was vindicated by the miraculous budding of his rod (Num. 17). He and his brother, for disobedience at Kadesh, were denied entry to the Promised Land. Aaron died on Mount Hor, in Edom. He was succeeded in the priesthood by Eleazar, his third son (Num. 20).

**Aaron's Beard**. Common name for St. John's Wort (*q.v.*).

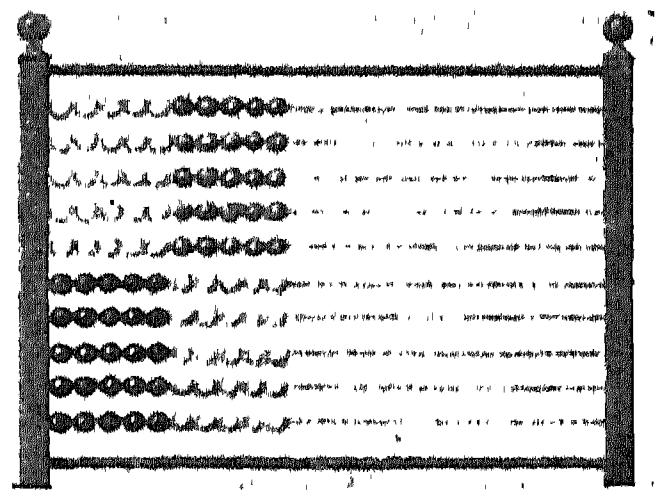
**Aaron's Rod**. Common name for Mullein (*q.v.*).

**Ab**. Fifth month of the Jewish sacred, and 11th month of the Jewish civil, year. It corresponds to parts of July-Aug. The fast for the destruction of the Temple, 586 B.C. and A.D. 70, is observed on its ninth day.

**Ababdeh**. People of Hamitic affinities who inhabit the desert between the Nile and the Red Sea N. and S. of the Egyptian frontier. The majority are nomads but two groups have settled in Qena and Assuan provinces. Unlike the adjacent and allied Bisharin, they have adopted fellahin speech and dress.

**Abaco**, GREAT and LITTLE. Two northernmost islands of the Bahamas, British West Indies. Great Abaco, or Lucaya, is 80 m. long by 20 m. wide; Little Abaco, 28 m. long. On the S.E. point of Great Abaco is a perforated rock, the Hole in the Wall, where an important lighthouse was built in 1836. Combined area, 879 sq. m. Pop. (est.) 3,500.

**Abacus**. Architectural term for the uppermost member of the



**Abacus**. Modern form of this contrivance as used in schools

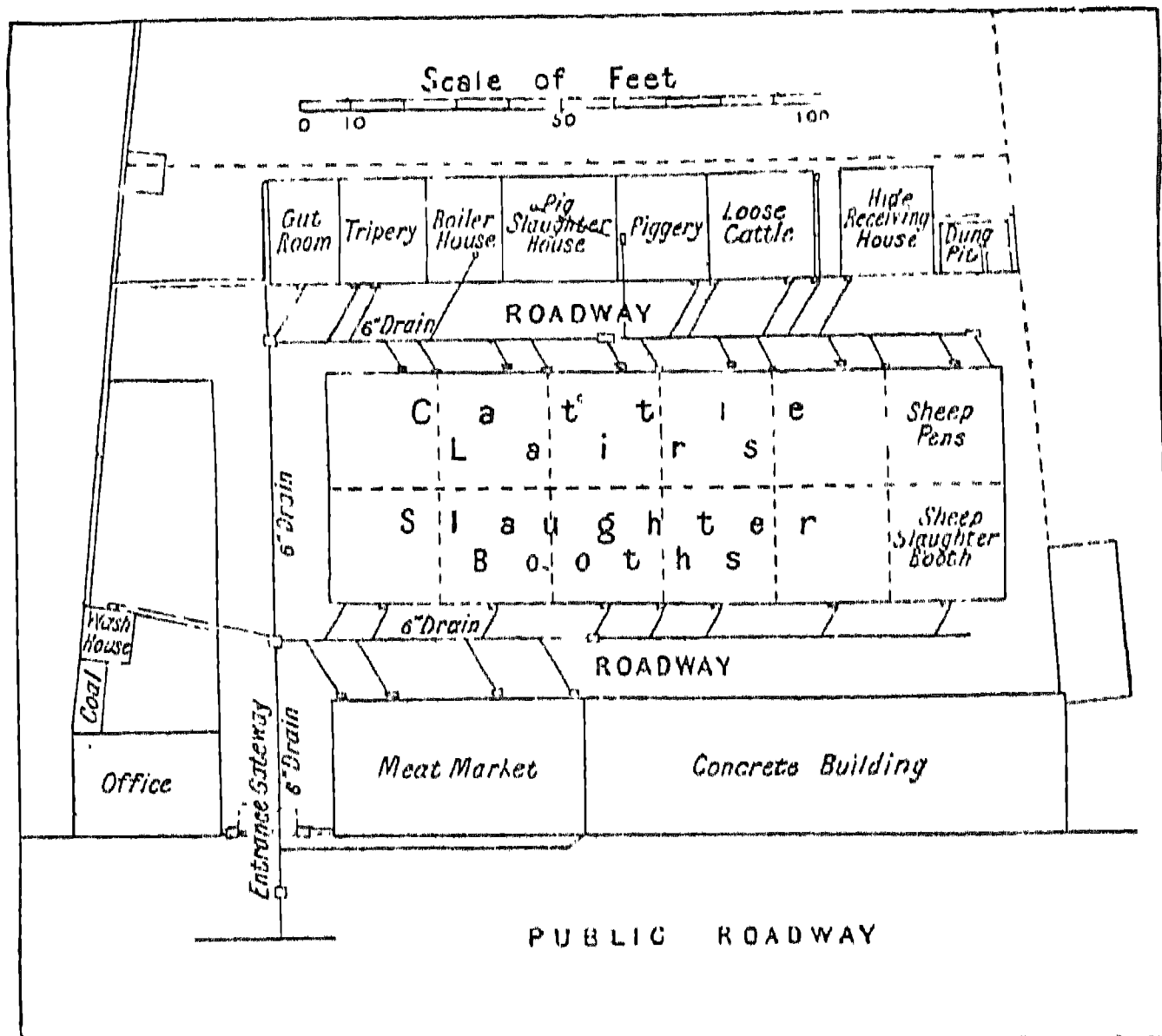
capital of a column. In an isolated column it may be round, square, or polygonal, but in columns carrying an entablature it is rectangular except in columns of the Ionic order, in which it is slightly scalloped to cover the corner volutes. Examples of such variations from the rectangular form occur in the Erechtheum and the Mausoleum at Halicarnassus. In French Gothic it is usually square; in Early English, usually circular.

**Abacus** (Lat., bench or slate, used by mathematicians). Mechanical contrivance for facilitating arithmetical calculations. It consists of an oblong wooden frame with several wires stretched across it lengthwise. Ten beads are strung upon each wire to allow full play for moving them into different positions and combinations. The abacus of ancient Greece and Rome survives in the Russian *shekeli*, the Chinese *suapan*, and the Japanese *soroban*.

**Abadan**. Island of Persia. It divides the Shatt-el-Arab into a delta where it enters the Persian Gulf. It is 40 m. long, and 20 m. wide at its widest; area 260 sq. m. After the formation of the Anglo-Persian Oil Company in 1909 (*see* British Petroleum Company), Abadan became the principal refinery and shipping centre for the Persian oil industry, and a thriving town grew up around what was by 1950 the largest oil refinery in the world (capacity 25 million tons a year), with a fluid catalytic cracker and aviation spirit plant. After nationalisation of the Persian oil industry in 1951, output dropped to about a million tons a year, but, under an agreement concluded in Oct., 1954, between Persia and eight leading oil companies, large-scale operations were resumed. Pop. (est.) 175,000



**Abadan**. Part of the vast oil refinery built by the Anglo-Persian Oil Co. on Abadan Island. Persia, in cooperation with eight oil companies, took over its working in 1954



Abattoir. Plan of a British provincial abattoir or public slaughter-house built on the booth system usually adopted in the United Kingdom

the meat purveyor. It is frequently nothing more than a shed, with no special design or arrangement. The chief objections to a private slaughter-house are that it is frequently in a crowded thoroughfare, therefore a nuisance from the continual driving of animals to it, and a cause of depreciation in the value of adjacent property. More serious is the impracticability of efficient control and inspection. As a rule, a private slaughter-house consists of only one compartment. It is usually impossible for one butcher to provide a slaughter-house for himself with separate compartments for slaughtering, cleaning the offal, etc.

During the last 40 years many fine public abattoirs have been erected in the United Kingdom by local authorities, and a new department of the engineering profession has been formed in order to provide up-to-date equipment for them. Public abattoirs should be situated conveniently near the cattle market, and, if possible, away from the centre of the town and the principal traffic. The market for dead meat should also be close at hand; in fact, the whole business of the meat industry of the city should be centralized as far as possible. The flooring should be impervious, a complete system of drainage instituted, and an abundant water supply laid on. Within the abattoir two systems of construction are adopted, the

open-hall system and the booth system. In the former the open hall is a large building without any subdivisions, there being nothing inside except the mechanical equipment for slaughtering. In the booth system the hall is divided into separate compartments. This permits privacy in the operations, and the letting of separate booths to individual butchers. In Great Britain the booth system is usually adopted.

During the Second Great War the Ministry of Food concentrated slaughtering in a few abattoirs to economize labour and transport and to control distribution.

A large public abattoir suitable for the needs of a great city will usually consist of the following departments: (1) lairage; (2) slaughtering rooms or halls, subdivided into a hall for cattle, a portion of the same hall for sheep and calves, a hall for pigs, and a hanging-house or cooling-chamber; (3) cold chambers for maturing and storing meat; (4) offal-room and tripe-house; (5) meat inspector's room; (6) room for condemned meat; (7) destructor-room for disposing of condemned meat; (8) engine and boiler house, with steam-boiler, steam-engine, and refrigerating machine; (9) manure depot. See Food, Inspection of. Consult also Public Abattoirs and Cattle Markets, Schwarz.

**Abba.** Aramaic word meaning father, used three times in the N.T.

(Mark 14; Rom. 8; Gal. 4) in reference to God. As far as is known, the word was restricted to the Deity. It lingers as a title for bishops in the Coptic Church.

**Abbadie, Antoine Thomson d'** (1810-97). French explorer and scientist. Born in Dublin, of Franco-Irish parentage, he was educated in France and became a naturalized Frenchman. In 1835 he was sent to Brazil by the Académie des Sciences, and travelled in Abyssinia (1838-48). His works include a Geodesy of Ethiopia, a Dictionary of the Amharic (Amaric) Language, and a Geography of Ethiopia. He left his estate to the Académie des Sciences on condition that it issued a catalogue of 500,000 stars. His younger brother, Armand Michel d'Abbadie (1815-93), published in 1868 an account of their travels. He died March 19, 1897.

**Abbas I** (c. 1557-c. 1628). Shah of Persia, known as the Great. The son of Shah

Mahomed, he succeeded his father in 1586. In 1597, near Herat, he defeated and drove out the Uzbeks. In 1622, aided by an English fleet, he captured the island of Ormuz, diverting its



Abbas I, the Great, Shah of Persia

trade to Gombroon, named after him Bander Abbasi, and in 1623 took Bagdad from the Turks. He was an enlightened administrator, though cruel and capricious.

**Abbas I** (1813-54). Viceroy of Egypt. A son of Tusun Pasha and grandson of Mehemet Ali, he fought under his uncle Ibrahim Pasha in Syria. In 1848 he succeeded Ibrahim as regent, and in 1849, after the death of Mehemet Ali, became Viceroy of Egypt. Cruel and reactionary, he was murdered by two slaves July, 1854.

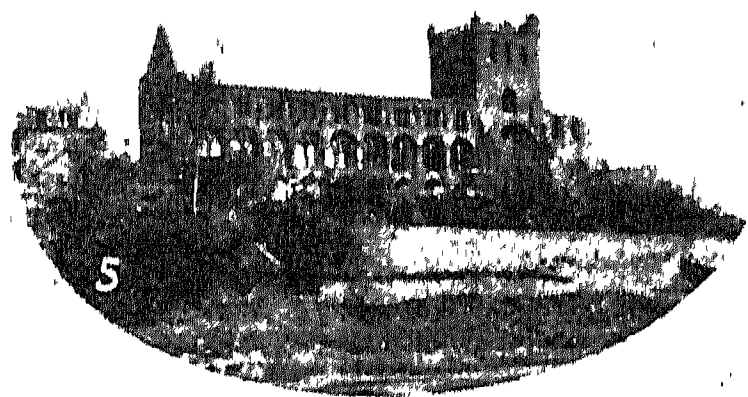
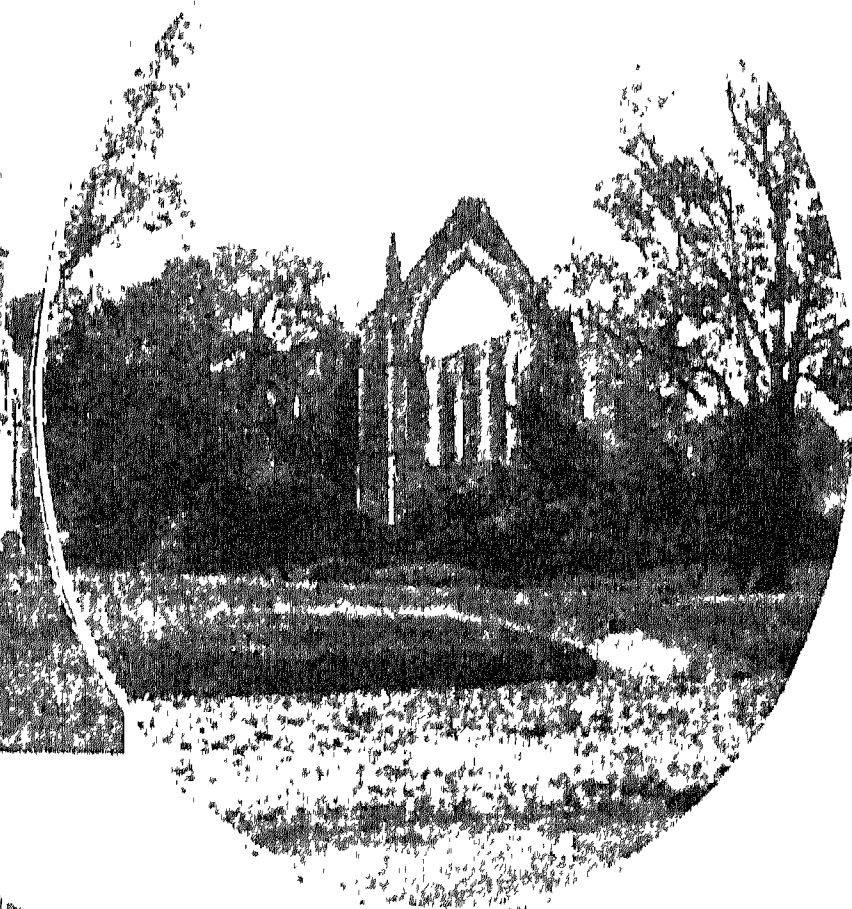
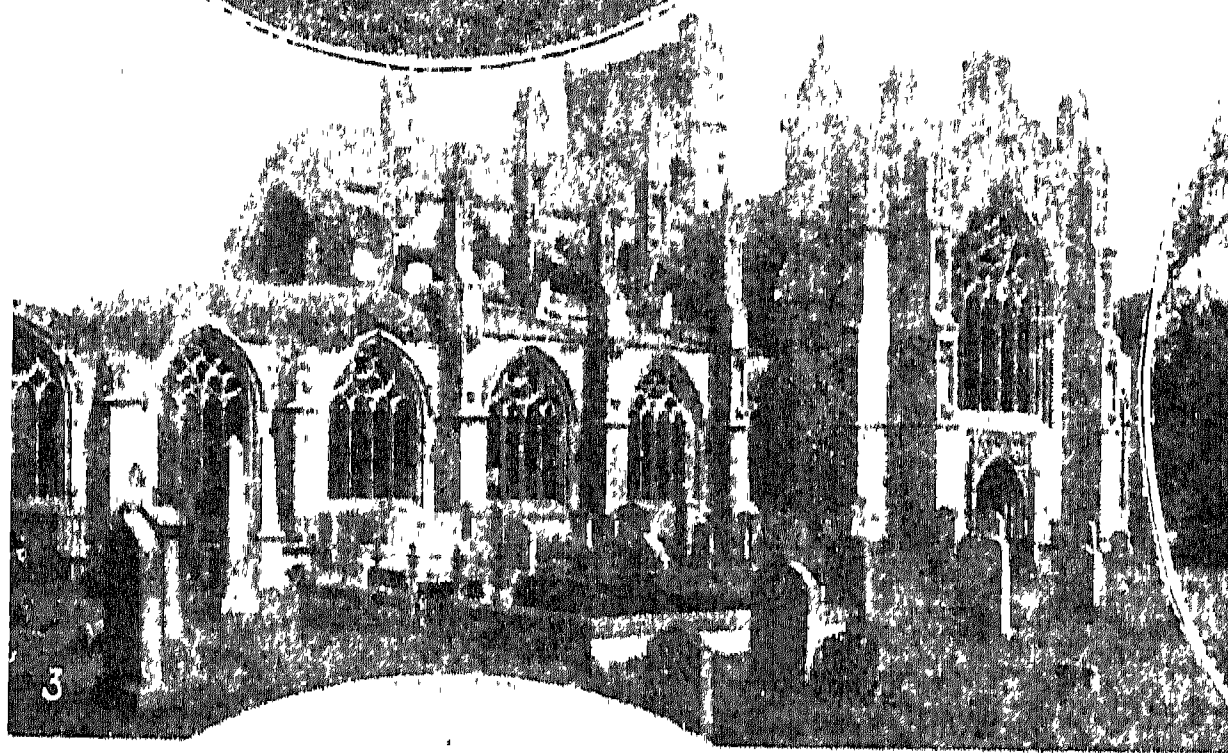
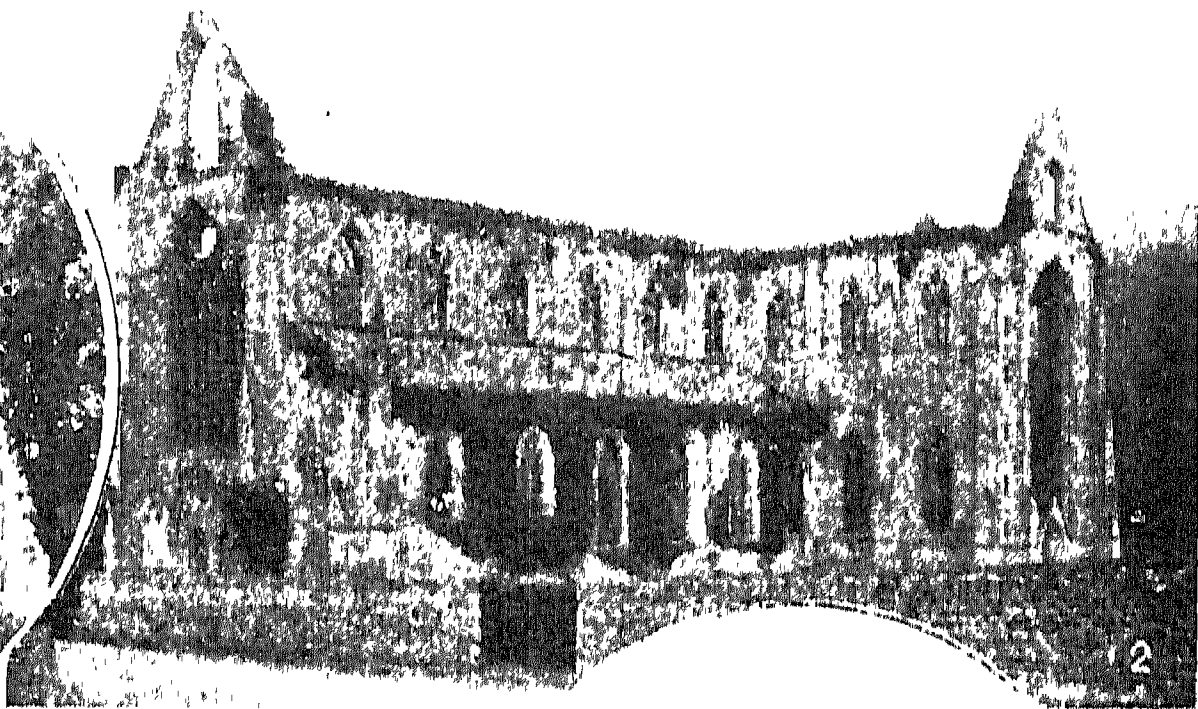
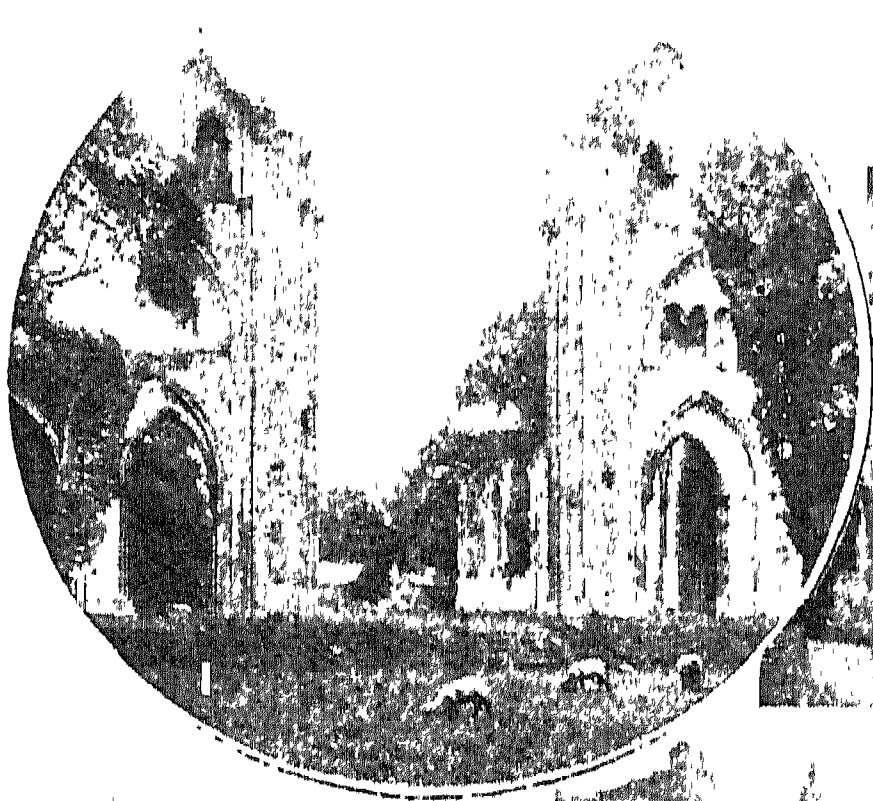
**Abbas II** or **Abbas Hilmi** (1874-1914). Last Khedive of Egypt. The eldest son of Tewfik Pasha, whom he succeeded in 1892,



Abbas II, Khedive of Egypt, 1892-1914

he received a western education. Becoming reconciled to foreign control, he took a considerable interest in the social and economic improvement of





1. Glastonbury Abbey, Somersetshire, Benedictine house once covering 60 acres. 2. Tintern Abbey, Cistercian foundation, near Chepstow, Monmouthshire. 3. Melrose Abbey, Roxburghshire, another Cistercian building,

famous for carvings and traceries. 4. Bolton Abbey, near Skipton, Yorkshire, founded by Augustinians. 5. Jedburgh Abbey, Roxburghshire, Augustinian. 6. Fountains Abbey, Cistercian edifice near Ripon, Yorkshire

**ABBEY: RUINS OF GREAT MONASTIC BUILDINGS IN ENGLAND AND SCOTLAND**



monasteries mitred abbots formed the majority of the lords spiritual in the English Parliament. An abbot is elected, by the votes of the professed members of the community, for life. An abbot president is elected by the abbots of the federated houses of the particular order in each land. The election must be confirmed by the bishop of the diocese, or, if the house be exempt, as Westminster Abbey was, by the Pope. When the greater monasteries possessed large estates the abbot had all the authority of a lord of the manor. In Germany certain abbots—*e.g.* the abbot of Fulda—had sovereign powers.

**Abbot, GEORGE** (1562-1633). Archbishop of Canterbury. Born at Guildford in Oct., 1562, the son of a cloth-worker, he was educated at Guildford Grammar School and at Oxford, where he was thrice vice-chancellor. In 1609 he was appointed bishop of Coventry and Lichfield, in 1610 bishop of London, and in 1611 archbishop of Canterbury.



George Abbot, English Primate

In 1621, while hunting, he accidentally killed a keeper, and an inquiry was instituted into the conduct of a prelate who had committed involuntary homicide while engaged in so unclerical a pursuit. The inquiry fell to the ground, but left Abbot under a cloud. He died at Croydon on Aug. 4, 1633. Abbot was a pronounced puritan, and as such the prosecutor of both Roman Catholics and Nonconformist Protestants.

**Abbot, ROBERT** (1560-1617). English divine. Elder brother of George Abbot, archbishop of Canterbury, he was educated at Guildford Grammar School and at Balliol College, Oxford, of which he became master. A famous preacher, he was successively chaplain to James I, regius professor of Divinity at Oxford, and bishop of Salisbury. He wrote against Roman Catholic teaching and in defence of the Reformation, also a reply to Bellarmine on the royal supremacy, and a Latin treatise on the Gunpowder Plot.



Robert Abbot, English bishop

**Abbot, THE**. Twelfth of Sir Walter Scott's Waverley Novels. A sequel to *The Monastery*, with which the author connected it by making Edward Glendinning the last abbot of Melrose. Its chronology is at variance with history, but its intensely sympathetic study of Mary Queen of Scots ensures it a permanent place in historical fiction. The novel was first published in Sept., 1820.

**Abbot of Unreason** OR **LORD OF MISRULE**. Name given to the master of the revels in medieval times. He was chosen by election at times of festivity, particularly Christmas. At Oxford, Cambridge, the Inner Temple, and Gray's Inn he had charge of the Christmas revels, arranged the Latin plays, and acted as master of the ceremonies. His counterpart in certain French towns was called the Abbé de Liesse. Other names for an official with like authority were Abbas Stultorum, or Abbot of Fools, Abbé de la Malgouverne, and, in Scotland, Master of Unreason. At certain festive seasons the ordinary rules of life were relaxed and, under the direction of a master, a condition of misrule, unreason, folly, topsy-turvydom, prevailed.

**Abbotsbury**. Village of Dorset, England, 10 m. S.W. of Dorchester. Here is the largest swannery in the U.K., covering 25 acres. Pop. 552. See Swan.

**Abbotsford**. Residence of Sir Walter Scott. Built 1811-24, it is on the right bank of the Tweed,



Abbotsford. Sir Walter Scott's picturesque home near Melrose

3 m. W. of Melrose Abbey. A part of the building has been converted into a museum containing relics of the novelist.

**Abbots Langley**. Parish and village of Hertfordshire, England. It is 21 m. N.W. of London by L.M.S. Rly. Once a manor of St. Albans Abbey, its church of S. Lawrence contains Norman remains. Nicholas Breakspear, afterwards Pope Adrian IV, was born here. Pop. 3,909.

**Abbott, EDWIN ABBOTT** (1838-1926). British scholar and schoolmaster. Educated at the City of London School and St. John's Col-

lege, Cambridge, Abbott was senior classic in 1861 and afterwards fellow of his college. Having been ordained, he became a schoolmaster, and during 1865-89

was headmaster of his old school. He wrote sermons, works on divinity text-books for schools, and a Shakespearean Grammar, probably his most popular work. Made a fellow of the British Academy, 1913, he died Oct. 12, 1926.



Edwin A. Abbott, British scholar  
Elliott & Fry

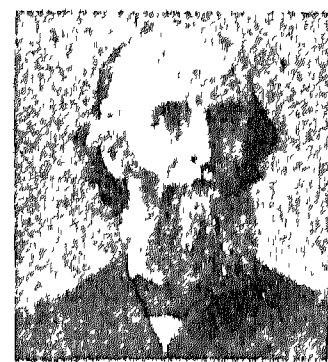
**Abbott, SIR JOHN JOSEPH CALDWELL** (1821-93). Prime Minister of Canada. The son of a



Sir John Abbott, Canadian Premier

clergyman, he became a successful lawyer, and before the Federation of 1867 was a member of the Canadian Parliament and solicitor-general. After 1867 Abbott became a follower of Sir John A. Macdonald, whose cabinet he joined in 1887. In 1891 he succeeded Macdonald as prime minister, but resigned Dec., 1892, and died Oct. 30, 1893.

**Abbott, LYMAN** (1835-1922). American Congregational divine and publicist. Born Dec. 18, 1835 at Roxbury, Massachusetts, he graduated at New York University in 1853, and became pastor at Terre Haute, Indiana, in 1860. In 1888 he succeeded Henry Ward Beecher as minister at Plymouth Church, Brooklyn. In 1893 he became chief editor of *The Outlook*, New York. His books include a *Life of Henry Ward Beecher*; *Dictionary of Religious Knowledge* (with T. J. Conant); *Life and Literature of the Ancient Hebrews*. He died Oct. 22, 1922.



Lyman Abbott, American divine

**Abbottabad**. Chief town of the Hazara district of West Pakistan. It is 63 m. N. of Rawalpindi, and is a military centre. It was named after General Sir James Abbott (1807-96), who was commissioner of Hazara 1845-53. Pop. 8,000.

- atm. Atmospheric.  
 a.t.s. At the suit of.  
 Att. Attaché; attorney.  
 att. Attached.  
 A.U.C. *Anno urbis conditae* (Latin), in the year of the founding of the city (Rome, 753 B.C.).  
 Aud. Auditor.  
 Aug. August.  
 aug. Augment.  
 aux. Auxiliary.  
 A.V. Authorised Version.  
 av. Average.  
 a.v. *Ad valorem* (Latin), to the value.  
 avdp. Avoidupois.  
 Ave. Avenue.  
 az. Azure (heraldry).  
 B. Bay; black (pencils).  
 b. Bachelor; bass (music); bay (horse); belgaw; born; bowled; boy; brother; bye(s) (cricket).  
 B.A. Buenos Aires.  
 Bah. Bahamas.  
 bal. Balance.  
 Balt. Baltic; Baltimore.  
 b. & b. Bed and breakfast.  
 b. & s. Brandy and soda.  
 bap. Baptized.  
 Bapt. Baptist.  
 Bar. Book of Baruch.  
 bar. Barometer.  
 Barb. Barbadoes.  
 Bart's. St. Bartholomew's Hospital, London.  
 B.A.W. Back axle weight.  
 B.B. Bitter and Burton.  
 B.B.C. British Broadcasting Corporation.  
 B.C. Before Christ; British Columbia.  
 Bd. Board; bond.  
 b.e. Bill of exchange.  
 B.E.A. British East Africa.  
 B.E.C.C. British Empire Cancer Campaign.  
 Beds. Bedfordshire.  
 Berks. Berkshire.  
 b.f. Beer firkin; brought forward.  
 B.G. Birmingham gauge.  
 B.Gu. British Guiana.  
 B.Hond. British Honduras.  
 B.I. British India.  
 Bib. Biblical; bibliography.  
 Biog. Biography.  
 Biol. Biology.  
 Bk. Bank.  
 Bkg. Banking.  
 B.L. Bill of lading; black letter (type).  
 B.M. *Beata Maria* (Latin), Blessed Mary; *beatæ memoriæ* (Latin), of blessed memory; bench mark; British Monomark; British Museum.  
 b.m. Board measure.  
 B.M.J. British Medical Journal.  
 B.O. Body odour; branch office.  
 b.o. Broker's order; buyer's option.  
 B. of E. Bank of England.  
 bol. Bolus.  
 B.O.P. The Boy's Own Paper.  
 bor. Borough.  
 B.O.T. Board of Trade.  
 bot. Botanical; bottle; bought.  
 Bp. Bishop.  
 B.P. British Pharmacopoeia; British public; Baden-Powell (Baron).  
 b.p. Below proof; bill payable; boiling point.  
 bpl. Birthplace.  
 B.Q. *Bene quiescat* (Latin), may he rest well.  
 Br. Breton; bridge; British; brother.  
 B.R. British restaurant.  
 b.r. Bill receivable.  
 Brec. Breconshire.  
 brms. Bedrooms.  
 Bros. Brothers.  
 b.s. Balance sheet; bed-sitting (room); bill of sale.  
 B.S.A. Birmingham Small Arms Company; British South Africa.  
 B.S.T. British summer time.  
 B.T.H. British-Thomson-Houston.  
 B.Th. U. British thermal unit.  
 bu-(s). Bushel(s).  
 Bucks. Buckinghamshire.  
 B.U.P. British United Press.  
 B.V.M. *Beata Virgo Maria* (Latin), Blessed Virgin Mary.  
 B.W.I. British West Indies.  
 Byz. Byzantine.  
 C. Cape; Centigrade; centre (stage); Chancellor; club (cards); cold (tap); Conservative; Consul; one hundred (Roman).  
 c. Caught (cricket); cent(s); centime(s); *circa* (Latin), about; *contra* (Latin), against; contralto.  
 C.A. Central America; Court of Appeal.  
 C/A. Capital account.  
 ca. *Circa* (Latin), about.  
 cal. Calendar; calorie.  
 Calif. California.  
 Cambs. Cambridgeshire.  
 Can. Canada; Canon; *cantoris* (Latin), of the choir.  
 Canpac. Canadian Pacific Railway.  
 Cant. Canticles (Song of Solomon).  
 Cantuar *Cantuariensis* (Latin), of Canterbury (Abp.'s signature).  
 cap. Capital letter; chapter; number of an Act of Parliament.  
 car. Carat.  
 Cards. Cardiganshire.  
 Carlisl *Carlilensis* (Latin), of Carlisle (Bp.'s signature).  
 Cas. Castle.  
 Cath. Cathedral; Catholic.  
 C.C. Cape Colony; Circuit Court; Civil Court; County Council(-lor); County Court; curate in charge.  
 cc. Chapters.  
 c.c. Contra credit; cubic centimetre(s); cubic contents.  
 C.C.C. Central Criminal Court.  
 C.C.P. Court of Civil Procedure.  
 C.Cr.P. Court of Criminal Procedure.  
 C.D. Civil death; contagious diseases.  
 c.d. With dividend.  
 C.E. Chief engineer; civil engineer; Church of England.  
 Cels. Celsius.  
 Cent. Centigrade; Central; century.  
 cert. Certainty; certificate.  
 Cestr *Cestriensis* (Latin), of Chester (Bp.'s signature).  
 cet. par. *Ceteris paribus* (Latin), other things being equal.  
 cf. Confer (Latin), compare.  
 c.f. Carried forward.  
 c.f.i. Cost, freight, insurance.  
 C.G. Centre of gravity; coastguard.  
 cg. Centigramme(s).  
 Ch. Chancery; chaplain; chief; church.  
 ch. Chain (measure); champion (dogs); chapter; child.  
 cha. Chapel.  
 Chron. Book of Chronicles.  
 C.I. Cast iron; Channel Islands.  
 Cicestr *Cicestriensis* (Latin), of Chichester (Bp.'s signature).  
 C.I.D. Criminal Investigation Department.  
 Cie. *Compagnie* (French), company.  
 c.i.f.(c). Cost, insurance, freight (commission).  
 circ. *Circiter* (Latin), about.  
 cl. Centilitre(s); class; classical; clause.  
 Clar. Clarinet.  
 C.L.P.A. Common Law Procedure Act.  
 C.M. Common measure (music).  
 cm. Centimetre(s).  
 C.M.D. Common measure double.  
 Cn. Canon (law).  
 C.N.R. Canadian National Railways.  
 C.O. Colonial Office; conscientious objector; Crown Office.  
 co. Company; county.  
 c/o Care of.  
 C.O.D. Cash on delivery; Concise Oxford Dictionary.  
 C. of E. Church of England.  
 C. of S. Church of Scotland.  
 Col. Epistle to the Colossians.  
 col. College; colon (currency); colour; column.  
 Coll. College.  
 coll. Collect(-ion); colloquial.  
 Colo. Colorado.  
 Com. Commissioner; committee; Communist.  
 comp. Comparative; compositor; compound.  
 Con. Conies; Consul.  
 con. *Contra* (Latin), against.  
 cond. Conditional.  
 Conf. Conference; Confucius.  
 Cong. Congregational(-ist); Congress.  
 conj. Conjugation; conjunction.  
 Conn. Connacht; Connecticut.  
 Cons. Conservative.  
 cons. Consonant.  
 Consols. Consolidated Funds.  
 Cor. Corinthian (architecture); *Cornu* (Latin), horn (music); Epistle to the Corinthians.  
 corr. *Corrigenda* (Latin), corrections to be made.  
 cox. Coxswain.  
 coy. Company.  
 C.P. Cape Province; Carter Paterson; Central Provinces (India); chronolum plated; Civil Procedure; Common Prayer; Communist Party; concert party.  
 c.p. Candle power; carriage paid.  
 C.P.R. Canadian Pacific Railway.  
 Cr. Creditor; Crown.  
 cr. Created; crown (paper size).  
 Cres. Crescent.  
 cresc. *Crescendo* (Italian), becoming louder.  
 crim. con. Criminal conversation (adultery).  
 Cr. P. Criminal Procedure.  
 crt. Court.  
 C.S. Chief Secretary; Civil Service.  
 cs. Cases (commerce).  
 cts. Centimes; cents.  
 cu., cub. Cubic.  
 C.U.P. Cambridge University Press.  
 c.v.d. Cash against documents.  
 C.W. Common Wealth.  
 c.w.o. Cash with order.  
 C.W.S. Co-operative Wholesale Society.  
 cwt. Hundredweight.  
 cyl. Cylinder.  
 D. *Deus* (Latin), God; diamond (cards); *Dominus* (Latin), the Lord; five hundred (Roman).  
 d. Daughter; day; delete; *denarius* or *denarii* (Latin), penny or pence; died; discharged.  
 § *Deletur* (Latin), let it be deleted.  
 D.A. Deposit account; District Attorney (U.S.A.).  
 d.a. Days after acceptance.  
 dag. Decagramme(s).  
 D.A.H. Disordered action of the heart.  
 dal. Decalitre(s).  
 dam. Decametre(s).  
 Dan. Danish.  
 dat. Dative.  
 D.B. Domesday Book; double-breasted.  
 D.B.S.T. Double British Summer Time.  
 d.b. Day book.  
 D.C. *Da capo* (Italian), from the beginning; direct current; District Court; District of Columbia.  
 D/D. Dated.  
 d.d. Days after date; day's date.  
 Deb. Debenture.  
 deb. Débutante.  
 Dec. *Decani* (Latin), of the Dean; December; Decorated (architecture).  
 dec. Decagon(-al); deceased; declaration; declension; declination; *decrecendo* (Italian), becoming quieter.  
 Def. Deferred (shares).  
 deg. Degree(s).  
 D.E.I. Dutch East Indies.  
 Del. Delaware.  
 del. Delegate; delete; *delevit* (Latin), he drew.  
 dele. Delete.  
 dep. Departs; deponent (grammar); deposed; deputy.  
 dept. *Département* (French civil division); department.  
 det. Detached.  
 Deut. Book of Deuteronomy.  
 D.F. Defender of the Faith.  
 d.f. Double-fronted.  
 D.G. *Dei gratia* (Latin), by the grace of God.  
 dg. Decigram(s).  
 D.H. De Havilland.  
 diam. Diameter.  
 dim. *Diminuendo* (Italian), becoming quieter; diminutive.  
 din. Dinar.  
 dis. Disconnect(-ed); discount(-ed); distribute (type matter).  
 disco. Discovered; discount(-ed).  
 dist. Distance; distinguish; district.  
 Div. Divine.  
 div. Dividend; division; divorced.  
 divi. Dividend.  
 dl. Decilitre(s).  
 dm. Decimetre(s).  
 D.N.B. Dictionary of National Biography.  
 D.O. Demi-official; direct order; district office; Dominions Office.

- H.W.M.** High water mark.  
**hy.** Heavy.  
**hyd.** Hydrostatic.  
**hyp.** Hypothetical.
- I.** Island; one (Roman).  
**i.** Intransitive.  
**ib., ibid.** *Ibidem* (Latin), in the same place.  
**I.C.** Indo-China; internal combustion.  
**i/c.** In charge of.  
**I.C.I.** Imperial Chemical Industries.  
**I.C.S.** Indian Civil Service; International Correspondence Schools.  
**id.** *Idem* (Latin), the same.  
**Ida.** Idaho.  
**I.D.B.** Illicit diamond buyer.  
**I.D.C.** Imperial Defence College.  
**I.E.** Indo-European.  
**i.e.** *Id est* (Latin), that is.  
**I.G.** *Industrien Gesellschaft* (a German chemical combine); Inspector General.  
**I.H.S.** *Jesus Hominum Salvator* (Latin), Jesus, the Saviour of mankind.  
**Ill.** Illinois.  
**illus.** Illustrated by; illustration(-s).  
**I.L.O.** International Labour Office.  
**il.o.** In lieu of.  
**I.L.P.** Independent Labour Party.  
**Imp.** *Imperator* (Latin), emperor; imperial.  
**imp.** Imperative; imperfect (grammar); import(-s)(-ed); impression (publishing); *imprimatur* (Latin), let it be printed.  
**in.** Inch.  
**Inc.** Incorporated.  
**incl.** Including; inclusive.  
**incog.** *Incognito* (Italian), unknown.  
**Ind.** Independent; Index; Indian; Indiana; industrial.  
**I.N.D.** *In nomine Dei* (Latin), in God's name.  
**ind.** Indicative.  
**inf.** Infinitive; Information; *infra* (Latin), below, or further on.  
**infra dig.** *Infra dignitatem* (Latin), beneath dignity.  
**I.N.I.** *In nomine Jesus* (Latin), in the name of Jesus.  
**in loc.** *In loco* (Latin), in its place.  
**inns.** Innings.  
**in pr.** *In principio* (Latin), in the first place.  
**I.N.R.I.** *Jesus Nazareus Rex Judaeorum* (Latin), Jesus of Nazareth, King of the Jews.  
**Ins.** Inspector; insurance.  
**I.N.S.** International News Service.  
**Insc.** Inscribed.  
**Insp.** Inspector.  
**inst.** *Instante mense* (Latin), in the present month; institute(-d).  
**int.** Interest; Interim; interior; internal; interval.  
**int. al.** *Inter alia* (Latin), among other things.  
**Inter.** Intermediate examination.  
**intr.** Intransitive.  
**Intro.** Introduction.  
**introd.** Introduced.  
**inv.** Invented; invoice(-d).  
**Io.** Iowa.  
**I.O.** India Office; Intelligence officer.  
**I.O.M.** Isle of Man.  
**I.O.W.** Isle of Wight.
- I.P.A.** India pale ale.  
**I.Q.** Intelligence quotient.  
**i.q.** *idem quod* (Latin), the same as.  
**I.R.** Inland Revenue.  
**I.R.A.** Irish Republican Army.  
**I.R.C.** International Red Cross.  
**I.R.O.** Inland Revenue Office.  
**Is.** Book of Isaiah; islands.  
**It.** Italian (usually of vermouth).  
**Ital.** Italian; italic.  
**I.W.** Isle of Wight.  
**I.W.T.** Inland water transport.  
**I.W.W.** Industrial Workers of the World.  
**I.X.** Jesus Christ.
- J.** Jack (cards); judge.  
**J.A.** Judge-Advocate.  
**Jam.** Epistle of St. James; Jamaica.  
**Jan.** January.  
**J.C.** Jesus Christ; Julius Caesar; *jurisconsultus* (Latin), lawyer; Justice-Clerk.  
**J.C.R.** Junior common room.  
**J.D.** Julian Day (calendar); Junior Dean.  
**Jer.** Book of Jeremiah.  
**JJ.** Justices.  
**Jn.** Junction.  
**Jo'burg.** Johannesburg.  
**joc.** Jocular(-ly); jocular(-ly).  
**J.P.** Justice of the Peace.  
**jr.** Junior.  
**Jud.** Book of Judith.  
**jud.** Judicial.  
**Judg.** Book of Judges.  
**Jun(-r).** Junior.
- K.** Carat; kilogramme(-s); King.  
**Kans.** Kansas.  
**K.B.(D).** King's Bench (Division).  
**kc(s).** Kilocycles.  
**kg.** Kilogramme(-s).  
**kilo.** Kilogramme; kilometre.  
**K.K.K.** Ku-Klux-Klan.  
**kl.** Kilolitre(-s).  
**K.L.M.** *Koninklijke Luchtvaart Maatschappij* (Royal Dutch Air Lines).  
**K.M.** King's Messenger.  
**km.** Kilometre(-s).  
**k.o.** Knock-out.  
**kr.** Kronen.  
**Kt.** Knight.  
**Ky.** Kentucky.
- L.** Fifty (Roman); Lake; Latin; learner (motoring); left; Liberal; lira or lire.  
**£** *Libra* (Latin), pound(-s) (money).  
**l.** Large; length; line; link(-s) (measure); litre(-s).  
**La.** Louisiana.  
**L.A.** Law agent; local authority.  
**£A.** Australian pound(-s).  
**la.** Last(-s) (weight).  
**Lab.** Labour; Labrador.  
**lab.** Laboratory.  
**Lam.** Lamentations of Jeremiah.  
**Lancs.** Lancashire.  
**Lat.** Latin.  
**lat.** Latitude; latrine.  
**lb.** *Libra* (Latin), pound(-s) (weight).  
**l.b.** Leg-bye(-s).  
**l.b.w.** Leg before wicket.  
**L.C.** Left of centre (stage); level crossing.  
**l.c.** Letter of credit; *locus citatus* (Latin), the passage mentioned; lower case (type).  
**l/c.** Letter of credit.
- L.C.M.** Least common multiple.  
**L.D.** *Laus Deo* (Latin), praise be to God; Low Dutch.  
**L.E.** Labour exchange.  
**£E.** Egyptian pound(-s).  
**Leg.** Legation.  
**leg.** Legal; *legato* (Italian), smoothly.  
**Leics.** Leicestershire.  
**Lev(it).** Book of Leviticus.  
**L.G.** Lloyd-George (1st Earl); Low German; The London Gazette.  
**L.Gr.** Low Greek.  
**L.H.** Left hand.  
**Lib.** Liberal; librarian; library.  
**Lines.** Lincolnshire.  
**liq.** Liquid.  
**Lit.** Literature; Little.  
**lit.** Liberal(-ly); litre.  
**Lit. Hum.** *Litterae Humaniores* (Latin), Oxford examination in classics.  
**LL.** Laws.  
**L.L.** Late, or low, Latin; Lend-Lease.  
**ll.** Lines.  
**L.M.** Long measure (music).  
**L.M.S.(R.).** London, Midland, and Scottish Railway.  
**L.N.E.R.** London and North-Eastern Railway.  
**loc. cit.** *Loco citato* (Latin), at the place mentioned.  
**log(-s).** Logarithm(-s).  
**Lon.** London.  
**long.** Longitude.  
**loq.** *Loquitur* (Latin), he speaks.  
**L.P.** Long primer; low pressure.  
**L.P.O.** London Philharmonic Orchestra.  
**L.P.T.B.** London Passenger Transport Board.  
**Lr.** Lower.  
**L.S.** *Locus sigilli* (Latin), the place of the seal.  
**L.S.C.** Lower School Certificate.  
**L.s.d.** *Librae, solidi, denarii* (Latin), pounds, shillings, and pence.  
**L.S.E.** London School of Economics.  
**L.S.O.** London Symphony Orchestra.  
**L.S.T.** Local standard time.  
**L.T.** Line telegraphy; London Transport; low tension.  
**£T** Turkish pound(-s).  
**lt.** Light (adjective).  
**Ltd.** Limited.  
**L.U.E.** Left upper entrance.  
**Luth.** Lutheran.  
**L.V.** Last vehicle; Licensed Victuallers.  
**L.W.** Long wave.  
**L.W.L.** Load water line.  
**L.W.M.** Low water mark.  
**LXX.** The Septuagint.
- M.** Male; Martyr; Master; mate; men; Methodist; *Monsieur* (French), Mr.; one thousand (Roman).  
**m.** Malden(-s) (cricket); married; masculine; metre(-s); mile(-s); mill; minin; minor; minute(-s); month(-s); mother.  
**ma.** Major (elder).  
**m/a.** My account.  
**Macc.** Book of Maccabees.  
**mach.** Machinery.  
**mag.** Magazine; magnetic; magneto; magnitude; magnum.  
**Mal.** Book of Malachi.  
**Man.** Manitoba.  
**man.** Manual; manufacture(-d).
- M & B 693.** May and Baker sulphonamide.  
**Mar.** March.  
**mar.** Married; maritime.  
**marg.** Marginal.  
**Mat.** Gospel of St. Matthew; matinee; Matins.  
**max.** Maxim; maximum.  
**M.C.** Master of ceremonies.  
**M/C(r).** Manchester.  
**Md.** Maryland.  
**M.D.** Mentally deficient; Middle Dutch.  
**m.d.** Month's date.  
**Me.** Maine.  
**M.E.** Marine engineer; Middle East; Middle English.  
**mech.** Mechanical.  
**Med.** Medical; medieval; Mediterranean; medium.  
**mem.** Memento; memorandum; memorial.  
**Mer.** Merionethshire.  
**mer.** Meridian.  
**Mess.** Messenger.  
**Messrs.** *Messieurs* (French), Sirs.  
**Met.** Metallurgical; metaphysical; meteorology; metronome; metropolitan; Metropolitan Railway.  
**Meth.** Methodist.  
**meth.** Methylated spirit.  
**mf.** *Mezzo forte* (Italian), moderately loud.  
**m.f.** More follows.  
**mfd.** Manufactured.  
**mfg.** Manufacturing.  
**M.F.H.** Master of Foxhounds.  
**M.F.N.** Most favoured nation.  
**M.Fr.** Middle French.  
**mfr.** Manufacturer.  
**mg.** Milligramme(-s).  
**M.G.M.** Metro-Goldwyn-Mayer.  
**M.H.G.** Middle High German.  
**M.I.** Medical inspection; Military intelligence.  
**mi.** Minor (younger).  
**Mic.** Book of Micah.  
**Mich.** Michigan.  
**Middx.** Middlesex.  
**mil.** Military; milreis.  
**Min.** Minister; Ministry; minister.  
**min.** Mineral; minimum; minimum; minutes (youngest); minute.  
**Minn.** Minnesota.  
**Miss.** Mississippi.  
**M.It.** Middle Italian.  
**mkt.** Market.  
**M.L.** Medieval Latin.  
**ml.** Millilitre(-s).  
**M.L.G.** Middle Low German.  
**Mlle., Mlle.** *Mademoiselle* (French), Miss.  
**MM.** Martyrs; *Messieurs* (French), Sirs.  
**M.M.** Maelzel's metronome; *Messageries Maritimes* (French shipping company).  
**mm.** Millimetre(-s).  
**m.m.** *Mutatis mutandis* (Latin), the necessary changes being made.  
**Mme.** Madame.  
**M.N.** Merchant Navy.  
**Mo.** Missouri.  
**M.O.** Manually operated; Medical Officer; money order.  
**mo.** Month.  
**mod.** Moderate; modern.  
**Mods.** Moderations.  
**M.O.H.** Master of Otter-hounds; Medical Officer of Health; Ministry of Health.  
**M.O.I.** Ministry of Information.  
**Mon.** Monastery; Monday; Monmouthshire.  
**mon.** Monetary.



- pp.** Pages; *pianissimo* (Italian), very soft.
- p.p.** Past participle; *per procuracionem* (Latin), by proxy; post paid.
- p.p.c.** Picture postcard.
- p.p.i.** Polley as proof of interest.
- P.P.S.** Parliamentary, or Principal, Private Secretary.
- P.Q.** Parliamentary question; Province of Quebec.
- Pr.** Prayer; Preferred stock; priest; primitive; printer; Provençal.
- P.R.** *Populus Romanus* (Latin), the Roman people; Prize Ring; Proportional Representation; Public Relations; Puerto Rico.
- pr.** Pair; pounder; present; pressure; price; pronoun.
- P.R.C.** *Post Romanam conditam* (Latin), after the founding of Rome.
- Preb.** Prebendary.
- Pref.** Preface; Preference shares; Preferred stock; prefix.
- Prelim.** Preliminary examination.
- prem.** Premium.
- prep.** Preparation; preparatory; preposition.
- Pres.** Presbyterian; President.
- Prim.** Primary; Primate; Primitive.
- pro.** Professional.
- Prob.** Probate; problem.
- Proc.** Proceedings; Proctor.
- Prof.** Professor.
- Prom.** Promenade (concert); promontory.
- pron.** Pronoun; pronounce(-d).
- prop.** Properly; property; proposition; proprietary.
- Propr.** Proprietor.
- Prot.** Protestant.
- pro tem.** *Pro tempore* (Latin), for the time being.
- Prov.** Book of Proverbs; Provence; Provost.
- prov.** Province; provincial; provisional.
- prox.** *Proximo mense* (Latin), in the next month.
- Ps(a).** Psalm.
- P.S.** Passenger steamer; Permanent Secretary; police sergeant; *postscriptum* (Latin), additional writing; Private Secretary; Privy Seal; prompt side.
- ps.** Pesetas; pieces.
- P.S.A.** Pleasant Sunday Afternoon.
- P.S.N.C.** Pacific Steam Navigation Company.
- Pt.** Point (geographical); Port.
- P.T.** Physical training; postal town; pupil teacher.
- pt.** Part; payment; pint; point; port.
- Ptg.** Participating.
- ptg.** Printing.
- P.T.I.** Physical Training Instructor.
- P.T.O.** Please turn over.
- pty.** Party; proprietary.
- pub.** Public; publication; published.
- publ.** Publish(-er) or (-ed).
- P.U.S.** Pharmacopoeia of the United States.
- P.X.** Please exchange.
- pxt.** *Pinxit* (Latin), he painted.
- Q.** Queen; query or question; the Quarto Shakespeare.
- q.** Quart; quire.
- Q.A.B.** Queen Anne's Bounty.
- Q.B. (D.).** Queen's Bench (Division).
- q.e.** *Quod est* (Latin), which is.
- q.e.d.** *Quod erat demonstrandum* (Latin), which was to be shown.
- q.e.f.** *Quod erat faciendum* (Latin), which was to be done.
- q.e.i.** *Quod erat invenendum* (Latin), which was to be found.
- q.l.** *Quantum libet* (Latin), as much as is desired.
- Qld.** Queensland.
- Q.M.** Queen's Messenger.
- qr.** Quarter; quire.
- Q.S.** Quarter Sessions.
- q.s.** *Quantum sufficit* (Latin), as much as suffices (a sufficient quantity).
- qt.** Quantity; quart.
- qto.** Quarto.
- qu.** Query or question.
- quad.** Quadrangle; quadrant; quadrilateral; quadruple.
- quant. suff.** *Quantum sufficit* (Latin), as much as suffices (a sufficient quantity).
- Que.** Quebec.
- quot.** Quotation; quotient.
- q.v.** *Quantum vis* (Latin), as much as you wish; *quod vide* (Latin), which see.
- qy.** Query.
- R.** Rabbi; Réaumur; response; restaurant; car available; retard (clock); *Rex* or *Regina* (Latin), King or Queen; right; river; road; Roman; rupee.
- r.** Radius; rare; residence; rises; rod(-s) (measure); road(-s); runs (cricket).
- R.A.** Right ascension.
- Rad.** Radical.
- rad.** Radius.
- rall.** *Rallentando* (Italian), becoming slower.
- R.C.** Red Cross; Regional Commissioner; right of centre (stage); Roman Catholic.
- R.C.M.P.** Royal Canadian Mounted Police.
- rept.** Receipt.
- Rd.** Road.
- R.D.** Research department; Rural Dean.
- R/D.** Return to drawer (banking).
- Rec.** Record(-er); recreation ground.
- rec.** Receipt; received; reception room; recipe.
- rect.** Receipt; rectangle; rectified.
- Red.** Redeemable.
- red.** Reduced.
- ref.** Referee; reference; referred; reformed; with reference to.
- refl.** Reflexive.
- Reg.** Regent; region(-al); registrar; regulation.
- reg.** Register(-ed); regular(-ly).
- rel.** Related; relative; religion.
- rem.** Remarks.
- Ren.** Renaissance.
- Rep.** Repertory company; Representative; Republic(-an).
- rep.** Repeat; repetition; *répétiteur* (orchestral); report(-er); represent(-ing); reprimand.
- repr.** Representing; reprinted; reproduced.
- res.** Reserve(-d); residence; resigned.
- resp.** Respective(-ly); respondent.
- rest.** Restored.
- ret(-d).** Retire(-d); return (-ed).
- Rev.** Revelation of S. John; Revenue; Reverend; Revolution (political).
- rev.** Reverse(-d); revised; revolution (mechanical).
- R.F.** Representative fraction; *République française* (French Republic).
- R.H.** Right hand.
- Rho(d).** Rhodesia.
- R.I.** Rhode Island.
- R.I.C.** Royal Irish Constabulary.
- R.I.P.** *Requiescat in pace* (Latin), may he rest in peace.
- rit.** *Ritardando, ritenente, ritenuto* (Italian), becoming slower.
- R.K.O.** Radio - Keltch - Orpheum.
- R.L.O.** Railway Liaison officer.
- R.L.S.** Robert Louis Stevenson.
- ry.** Railway.
- Rm.** Reichsmark(-s).
- R.M.** Resident magistrate; Royal Mail.
- rm.** Ream; room.
- R.M.O.** Resident Medical Officer.
- R.M.S.** Royal mail steamer.
- R.M.S.P.** Royal Mail Steam Packet Company.
- R.O.** Receiving officer; receiving order; recruiting officer; relieving officer; returning officer.
- ro.** *Recto* (Latin), on the right-hand page; road; road.
- r.o.** Run on (type); run out (cricket).
- Roffen** *Roffensis* (Latin), of Rochester (Bp.'s signature).
- Rom.** Epistle to the Romans; Roman.
- rom.** Roman (type).
- R.P.** Reply paid; reprint; rules of procedure.
- rpt.** Repeat; report.
- rr.** *Rarissime* (Latin), very rarely; rear.
- Ra.** Rupees.
- R.S.C.** Rules of the Supreme Court.
- R.S.F.S.R.** Russian Soviet Federal (or Federative) Socialist Republic.
- R.S.O.** Railway sorting office, railway sub-office.
- R.S.V.P.** *Répondez s'il vous plaît* (French), answer, if you please.
- Rt.** Right.
- R.T.** Radio telephony; received text.
- R.U.E.** Right upper entrance.
- R.V.** Rendezvous; Revised Version.
- RX.** Rix dollar; tens of rupees.
- R.Y.S.** Royal Yacht Squadron.
- S.** Saint; Saxon; Scotland; Socialist; South; spade (cards); statute; sun.
- s.** Scalar; second(-s); sets (astronomy); section; shilling(-s); singular; son; soprano; succeeded.
- S.A.** Sex appeal; small arms; *Société Anonyme* (French), limited company; South Africa; South America; *Sturm Abteilung* (German), Storm Division.
- Sask.** Saskatchewan.
- Sat.** Saturday.
- S.A.T.B.** Soprano, alto, tenor, bass.
- Sax.** Saxon(-y).
- sax.** Saxophone.
- S.B.** Savings bank; simultaneous broadcast; single-breasted; Swedenborgian.
- Sc.** Scene; science; Scotland or Scots.
- S.C.** Salvage Corps; same case (law); South Carolina; special constable; Staff College; Supreme Court.
- sc.** *Scilicet* (Latin), to wit, or being understood; scruple(-s) (measure); *sculpsit* (Latin), he made this sculpture, or he engraved.
- s.c.** Small capitals.
- Scan(d).** Scandinavia(n).
- Sch.** School; schooner.
- S.C.M.** State certified midwife.
- scr.** Scruple (measure).
- Sculp(s).** *Sculpsit* (Latin), he made this sculpture, or he engraved.
- Sd.** Signed; sound (geographical).
- S.D.** Sequence-dating; sight draft.
- sd.** Sewed (bookbinding).
- s.d.** Semi-detached; several dates; *sine die* (Latin), without a day, indefinitely.
- S. D(ak).** South Dakota.
- S.D.I.** Soft Drinks Industries.
- S.E.** South-East; Stock Exchange.
- Sec.** Secondary; secretary; section.
- sec.** Secant; second.
- sect.** Section.
- Sem.** Seminary; Semble.
- sem.** Semi-colon.
- semp.** *Sempre* (Italian), always, throughout.
- Sen.** Senate; Senator; senior.
- sep.** Separable; separate; *sepultus* (Latin), buried.
- Sept.** September; Septuagint.
- seq.** *Sequentia* (Latin), the following; *sequitur* (Latin), it follows.
- ser.** Series.
- S.F.** Sinn Fein.
- s.g.** Specific gravity.
- S.H.A.P.E.** Supreme Headquarters Allied Powers in Europe.
- S.I.** Sandwich Islands; Seine-Inferieure; staff inspector.
- Sig.** *Signor* (Italian), Mr.
- sig.** Signal; signature.
- Sigra.** *Signora* (Italian) Mrs.
- sing.** Singular.
- sit.** Situation.
- Sjt.** Sergeant.
- sk.** Sack (weight).
- Skt.** Sanskrit.
- Sl.** Slavonic.
- S.L.** Serjeant at Law; Solicitor at Law.
- Slov.** Slovak; Slovene.
- s.l.p.** *Sine legitima prole* (Latin), without lawful issue.
- S.M.** Senior magistrate; short measure (muscle).
- S.M.T.** Scottish Motor Traction (Company).
- s.n.** *Sine nomine* (Latin), without name.
- So.** South.
- S.O.** Saturdays only; standing order; Stationery Office; sub-office.
- s.o.** Seller's option.
- Soc.** Socialist; Society.
- S. of S.** Secretary of State; Song of Solomon.
- sol.** Solicitor; solution.
- Som.** Somerset.
- sop.** Soprano.
- sov.** Sovereign (£1).

## Section II. ASSOCIATIONS, INSTITUTIONS, TITLES, HONOURS, DEGREES

In this section, in order to save space and unnecessary repetition, those abbreviations which, when conjoined with other initials, stand for Member, Licentiate, Associate, Fellow, or President of an association or society are not usually listed under M., L., A., F., or P. Therefore, if an abbreviation is not found under any of these letters, look under the heading of the second letter in the abbreviation to find the name of the association or society, with the appropriate degrees of membership indicated in bold type. Also included here are various "root" abbreviations common to many localities (e.g. **U.D.C.** for Urban District Council), where the full abbreviation would normally include a preliminary initial, variable in accordance with the name of the locality. It should also be noted, in connexion with such "root" abbreviations as **R.C.** (Rowing Club) and **D.S.** (Dramatic Society), that a preliminary **A.** may signify Amateur: thus in the town of **Z**, the abbreviation **Z.A.D.S.** would be recognized as signifying the **Z** Amateur Dramatic Society. By combining two or more of the "root" abbreviations in this list, e.g. **O.U.** for Oxford University plus **D.S.** for Dramatic Society, the inquirer may easily work out for himself the significance of many more abbreviations than could possibly be printed here.

- A.** Preceding other initials, may stand for Amateur, Assistant, or Associate.
- A.A.** Architectural Association; Associate in Arts; Athletic Association; Automobile Association.
- A.B.A.** Amateur Boxing Association.
- A.B.C.** Australian Broadcasting Corporation.
- A.C.** Advisory Committee; Appeal Court; Assistant Commissioner; Athletic Club.
- A.C.A.** Associate of Institute of Chartered Accountants.
- A.C.P.** Association of Correctors of the Press.
- A.C.S.** American College of Surgeons (**F.**).
- A.D.A.** Atomic Development Authority.
- A.E.L.T.C.** All England Lawn Tennis Club.
- A.E.R.A.** Associate Engraver, Royal Academy.
- A.E.U.** Amalgamated Engineering Union.
- A.F.A.** Amateur Football Association.
- A.F.C.** Association Football Club.
- A.F.L.** American Federation of Labor.
- A.G.** Accountant General; Agent General; Attorney General.
- A.I.** American Institute; Anthropological Institute; Auctioneers' and Estate Agents' Institute (**A., F.**).
- A.I.A.** Association of International Accountants (**A., F.**).
- Ald.** Alderman.
- A.I.P.A.** Incorporated Society of Auctioneers and Landed Property Agents (**A., F.**).
- A.M.** Albert Medal; Associate Member.
- A.M.A.** Incorporated Association of Assistant Masters in Secondary Schools.
- A.M.C.** Art Masters' Certificate.
- A.N.S.** Academy of Natural Science.
- A.O.D.** Ancient Order of Druids.
- A.O.F.** Ancient Order of Foresters.
- A.O.H.** Ancient Order of Hibernians.
- A.O.S.** Ancient Order of Shepherds.
- A.P.S.** Aborigines Protection Society; Association of Preparatory Schools.
- A.R.C.** Automobile Racing Club.
- A.R.C.E.** Academical Rank of Civil Engineer.
- A.S.A.** Amateur Swimming Association.
- A.S.E.** Amalgamated Society of Engineers.
- A.S.L.E. & F.** Associated Society of Locomotive Engineers and Firemen.
- ASLIB.** Association of Special Libraries and Information Bureaux.
- A.S.W.** Association of Scientific Workers.
- B.A.** Bachelor of Arts; British Academy (**F.**); British Association.
- Bac.** *Baccalaureus* (Latin), Bachelor (degree).
- B.A.C.I.E.** British Association for Commercial and Industrial Education.
- B.Agr.** Bachelor of Agriculture.
- Ball.** Balliol College.
- B. & F. B. S.** British and Foreign Bible Society.
- B.Arch.** Bachelor of Architecture.
- Bart.** Baronet.
- B.B.B.C.** British Broadcasting Board of Control.
- B.B.C.** British Broadcasting Corporation.
- B.C.** Boat Club; Borough Council; British Council.
- B.Ch.** *Baccalaureus Chirurgiae* (Latin), Bachelor of Surgery.
- B.Ch.D.** Bachelor of Dental Surgery (*Chirurgiae*, Latin).
- B.C.L.** Bachelor of Civil Law.
- B.Com(m).** Bachelor of Commerce.
- B.D.** Bachelor of Divinity.
- B.D.A.** British Dental Association.
- B.D.S.** Bachelor of Dental Surgery.
- B.E.** Bachelor of Engineering; (Order of the) British Empire (in titles).
- B.E.A.** British Esperanto Association; British European Airways.
- B.Ed.** Bachelor of Education.
- B.Eng.** Bachelor of Engineering.
- B.E.S.A.** British Engineering Standards Association.
- B. ès A.** *Bachelier ès Arts* (French degree).
- B. ès L.** *Bachelier ès Lettres* (French degree).
- B. ès S.** *Bachelier ès Sciences* (French degree).
- B.E.U.** British Empire Union.
- B.F.I.** British Film Institute.
- B.I.A.E.** British Institute of Adult Education.
- B.I.R.** Board of Inland Revenue.
- B.I.S.** Bank for International Settlements.
- B.L.** Bachelor of Law; British Legion.
- B. Litt.** Bachelor of Letters (*Litterarum*, Latin).
- B.LL.** Bachelor of Laws (*Legum*, Latin).
- B.M.** Bachelor of Medicine.
- B.M.A.** British Medical Association.
- B.M.E.** Bachelor of Mining Engineering.
- B.Med.** Bachelor of Medicine.
- B.Mus.** Bachelor of Music.
- Bn.** Baron.
- B.N.C.** Brasenose College.
- B.O.A.** British Optical Association (**F.**).
- B.O.A.C.** British Overseas Airways Corporation.
- B. of E.** Bank of England; Board of Education.
- B.O.G.** Bank Officers' Guild.
- B.O.T.** Board of Trade.
- B.P.C.** British Purchasing Commission.
- B.Phil.** Bachelor of Philosophy.
- B.R.C.S.** British Red Cross Society.
- Br. Omn. Rex.** *Britanniarum Omnium Rex* (Latin), King of all the Britains.
- B.S.A.** Bachelor of Science; British School at Athens.
- B.S.A.A.** British S. American Airways.
- B.Sc.** Bachelor of Science.
- B.S.C.** British Supply Council.
- B.S.I.** Boot and Shoe Industry (**A., F., M.**); British Standards Institution.
- Bt.** Baronet.
- B.Th.** Bachelor of Theology.
- B.U.F.** British Union of Fascists.
- B.W.I.** British Workmen's Institute.
- B.W.T.A.** British Women's Temperance Association.
- C.A.** Chartered Accountant; Church Army; Church Association; County Alderman; Court of Appeal.
- C.A.C.** Central Advisory Committee; County Agricultural Committee.
- C. and D.** Chemist and Druggist.
- Cantab.** *Cantabrigiensis* (Latin), member of Cambridge University.
- C.B.** Companion of the Order of the Bath.
- C.B.C.** Canadian Broadcasting Corporation.
- C.B.E.** Commander of the Order of the British Empire.
- C.B.S.** Church Building Society; Columbia Broadcasting System; Confraternity of the Blessed Sacrament.
- C.C.** Calus College; Chamber of Commerce; Chief Clerk; Circuit Court; City Council; Civil Court; County Council(-lor); County Court; Cricket Club; Crown Clerk; Cycling Club.
- C.C.C.** Central Criminal Court; Club Cricket Conference; Corpus Christi College; County Cricket Club.
- C.C.F.** Co-operative Commonwealth Federation.
- C.C.J.** County Court Judge.
- C.C.P.** Court of Common Pleas.
- C.C.S.** Corporation of Certified Secretaries (**A., F.**).
- C.D.** Chancery Division; *Corps Diplomatique* (French), diplomatic body.
- C. de G.** *Croix de Guerre* (French decoration).
- C.E.** Chancellor of the Exchequer.
- C.E.A.P.E.** Council for Education and Appreciation of Physical Environment.
- C.E.M.A.** Council for the Encouragement of Music and the Arts.
- C.E.M.S.** Church of England Men's Society.
- C.E.T.S.** Church of England Temperance Society.
- C.E.Y.M.S.** Church of England Young Men's Society.
- C.F.** Corresponding Fellow.
- C.G.** Commissary General; Consul General.
- C.G.I.** City and Guilds of London Institute (**A., F.**).
- C.G.T.** *Confédération Générale de Travail* (French trade union body).
- C.H.** Companion of Honour; Court House; Custom House.
- C.H.A.** Co-operative Holidays Association.
- Ch.B.** *Chirurgiae Baccalaureus* (Latin), Bachelor of Surgery.
- Ch.Ch.** Christ Church, Oxford.
- Ch.d'A.** *Chargé d'Affaires* (French), diplomat.
- Chev.** *Chevalier* (French).
- Ch.M.** *Chirurgiae Magister* (Latin), Master of Surgery.
- Chr.C.** Christ's College.
- C.I.** Imperial Order of the Crown of India; Institute of Commerce (**A., F.**).
- C.I.A.** Corporation of Insurance Agents (**A., F.**).
- C.I.B.** Corporation of Insurance Brokers (**A., F.**).
- C.I.D.** Committee of Imperial Defence; Criminal Investigation Department.
- C.I.E.** Companion of the Order of the Indian Empire.
- C.I.I.** Chartered Insurance Institute (**A., F.**).
- C.I.O.** Congress of Industrial Organizations.
- C.I.P.A.** Chartered Institute of Patent Agents.
- C.I.S.** Chartered Institute of Secretaries (**A., F.**).
- C.J.** Chief Justice.

- I.L.S. Incorporated Law Society.  
 I.M.A. Indian Military Academy.  
 Imp. *Imperator* or *Imperatrix* (Latin), Emperor or Empress.  
 I(nst).Mar.E. Institute of Marine Engineers (A., M.).  
 I.M.D. Indian Medical Department.  
 I.M.E. Institution of Mining Engineers (A., M.).  
 I(nst).Mech.E. Institution of Mechanical Engineers (A., M.).  
 I.M.T. Institute of the Motor Trade.  
 I.M.T.A. Institute of Municipal Treasurers and Accountants (A., F.).  
 I(nst).N.A. Institution of Naval Architects (A., M.).  
 Inst. Act. Institute of Actuaries.  
 Inst. F. Institute of Fuel (F.).  
 Inst. M.M. Institute of Mining and Metallurgy (M.).  
 Inst. P. Institute of Physics (A., F.).  
 Inst. P.I. Institute of Patentees (A., F., M.).  
 Inst.P.S. Institute of Private Secretaries (A., F., L.).  
 Inst. T. Institute of Transport (M.).  
 Inst. T.E. Institution of Transport Engineers (A., M.).  
 I.O. India Office; Institute of Opticians (F.).  
 I.O.B. Institute of Builders (A., F., M.).  
 I.O.F. Independent Order of Foresters.  
 I.O.G.T. International Order of Good Templars.  
 I.O.J. Institute of Journalists.  
 I.O.M. Indian Order of Merit.  
 I.O.O.F. Independent Order of Oddfellows.  
 I.O.R. Independent Order of Rechabites.  
 I.P. Institute of Plumbers.  
 I.P.S. Incorporated Photographic Society (F.).  
 I.R.A. Irish Republican Army.  
 I.R.C. International Red Cross.  
 I(nst). R.E. Institute of Radio Engineers (F.).  
 I.S.A. Incorporated Secretaries' Association (A., F.).  
 I.S.C. Imperial Service College.  
 Iscor. Iron and Steel Corporation of South Africa.  
 I.S.I. Iron and Steel Institute (M.).  
 I.S.M. Imperial Service Medal; Incorporated Society of Musicians.  
 I.S.O. Imperial Service Order.  
 I.S.T.C. Iron and Steel Trades Confederation.  
 I. Struct. E. Institute of Structural Engineers (F., M.).  
 I.W. Inspector of Works.  
 I.W.T. Institute of Wireless Technology (F., M.).  
 I.Z. I Zingari Cricket Club.  
 J.A. Judge-Advocate.  
 J.C.D. *Juris Civilis Doctor* (Lat.), Doctor of Civil Law.  
 J.D. Doctor of Jurisprudence; *Jurum Doctor* (Latin), Doctor of Laws.  
 J.I. Institute of Journalists (F., M.).  
 J.I.C. Joint Industrial Council.  
 J.P. Justice of the Peace.  
 J.P.B. Joint Production Board.  
 J.S. Japan Society (M.).  
 J.U.D. *Juris Utriusque Doctor* (Latin), Doctor of Civil and Canon Law.  
 K. King.  
 K.A. King-of-Arms; Knight of S. Andrew.  
 K.A.N. Knight of S. Alexander Nevsky.  
 K.B. King's Bench; Knight Bachelor; Knight of the Bath.  
 K.B.D. King's Bench Division.  
 K.B.E. Knight Commander of the Order of the British Empire.  
 K.C. Kennel Club; King's College (A.); King's Counsel; Knight of Columbus.  
 K.C.B. Knight Commander of the Order of the Bath.  
 K.C.H. Knight Commander of Hanover.  
 K.C.I.E. Knight Commander of the Order of the Indian Empire.  
 K.C.L. King's College, London (F.).  
 K.C.M.G. Knight Commander of the Order of S. Michael and S. George.  
 K.C.S.G. Knight Commander of the Order of S. Gregory.  
 K.C.S.I. Knight Commander of the Star of India.  
 K.C.V.O. Knight Commander of the Royal Victorian Order.  
 Keb. Kettle College.  
 K.G. Knight of the Garter.  
 K.G.C.B. Knight Grand Cross of the Order of the Bath.  
 K.G.F. Knight of the Golden Fleece.  
 K.G.St.J. Knight of Grace of the Order of S. John of Jerusalem.  
 K.H. Knight of Hanover.  
 K.H.C. Honorary Chaplain to the King.  
 K.H.P. Honorary Physician to the King.  
 K.H.S. Honorary Surgeon to the King; Knight of the Holy Sepulchre.  
 K.I.H. Kaiser-i-Hind Medal.  
 K.J.St.J. Knight of Justice of the Order of S. John of Jerusalem.  
 K.L.H. Knight of the Legion of Honour.  
 K.M. Knight of Malta.  
 K. of C. Knight of Columbus.  
 K.P. Knight of the Order of S. Patrick.  
 K.P.M. King's Police Medal.  
 K.R.C. Knight of the Red Cross.  
 K.S. King's Scholar.  
 K.S.G. Knight of S. Gregory.  
 K.S.I. Knight of the Star of India.  
 K.S.P. Knight of S. Patrick.  
 K.St.J. Knight of the Order of S. John of Jerusalem.  
 Kt. Knight.  
 K.T. Knight of the Thistle; Knight Templar.  
 L. *Preceding other initials, may stand for* Licentiate.  
 L.A. Legislative Assembly (M.); Library Association (A., F.); Literate in Arts; Local Authority; Member of Incorporated Society of Law Agents in Scotland.  
 L.A.A. London Association of Accountants (A., F.).  
 L.Adv. Lord Advocate.  
 L.A.M. London Academy of Music.  
 L.A.S. Land Agents' Society (F.); Lord Advocate of Scotland.  
 L.A.U.K. Library Association of the United Kingdom.  
 L.C. Lord Chamberlain; Lord Chancellor.  
 L.C.B. Lord Chief Baron.  
 L.Ch. Licentiate in Surgery (*Chirurgiae*, Latin).  
 L.C.J. Lord Chief Justice.  
 L.C.M. London City Mission; London College of Music (A., F., L.).  
 L.d'H. *Légion d'Honneur* (French decoration).  
 L.Div. Licentiate in Divinity.  
 L.D.S. Licentiate in Dental Surgery.  
 L.E.A. Local Education Authority.  
 L.E.C. Local Employment Committee.  
 Lès L. *Licencié ès Lettres* (French degree).  
 L.G.A. Local Government Association (F.).  
 L.G.B. Local Government Board.  
 L.G.U. Ladies' Golf Union.  
 L.H.A. Lord High Admiral.  
 L.H.C. Lord High Chancellor.  
 L.H.T. Lord High Treasurer.  
 Lic. Licentiate.  
 Linc. Lincoln College.  
 Lit.D. Doctor of Literature.  
 Litt.B. Bachelor of Letters (*Litterarum*, Latin).  
 Litt.D. Doctor of Letters (*Litterarum*, Latin).  
 L.J. Lord Justice.  
 L.L. Lord-Lieutenant.  
 L.L.A. Lady Literate in Arts.  
 L.L.B. Bachelor of Laws.  
 L.L.D. Doctor of Laws.  
 L.L.I. Lord-Lieutenant of Ireland.  
 L.L.L. Licentiate in Laws.  
 L.L.M. Master of Laws.  
 L.M. Licentiate in Medicine; Licentiate in Midwifery; Lord Mayor.  
 L.M.H. Lady Margaret Hall.  
 L.M.S. Licentiate in Medicine and Surgery; London Missionary Society.  
 L.N.U. League of Nations Union.  
 L.P. Labour Party; Lord Provost.  
 L.P.O. Lord President of the Council.  
 L.P.O. London Philharmonic Orchestra.  
 L.P.S. Lord Privy Seal.  
 L.P.T.B. London Passenger Transport Board.  
 L.R.C. Labour Representation Committee; Leander Rowing Club; London Rowing Club.  
 L.S. Linnean Society (A., F., M.).  
 L.S.C. London Society of Composers (M.).  
 L.S.E. London School of Economics.  
 L.S.O. Labour Supply Organization; London Symphony Orchestra.  
 L.T.A. Lawn Tennis Association; London Teachers' Association.  
 L.T.C. Lawn Tennis Club.  
 L.Th. Licentiate in Theology.  
 M. *Preceding other initials, may stand for* Member.  
 M.A. Master of Arts; Military Academy.  
 M.A.A. Master at Arms.  
 M.A.B. Metropolitan Asylums Board.  
 Magd. Magdalen(-e) College.  
 M.A.I. *Magister in Arte Ingeniaria* (Latin), Master of Engineering; Member of the Anthropological Institute.  
 M.A.O. Master of Obstetric Art.  
 March. Marchioness.  
 Marq. Marquess.  
 M.B. Bachelor of Medicine; Medical Board.  
 M.B.E. Member of the Order of the British Empire.  
 M.C. Member of Council.  
 M.C.C. Marylebone Cricket Club.  
 M.C.D. Doctor of Comparative Medicine; Member of the College of Dentists.  
 M.Ch. *Magister Chirurgiae* (Latin), Master of Surgery.  
 M.Ch.Or.h. Master of Orthopaedic Surgery.  
 M.C.L. Master of Civil Law.  
 M.Com. Master of Commerce.  
 M.Comm. Master of Commerce and Administration.  
 M.D. Doctor of Medicine.  
 M.D.S. Master of Dental Surgery.  
 M.E. Most Excellent.  
 M.E.C. Member of Executive Council.  
 Med. Medallist.  
 M.Eng. Master of Engineering.  
 Mert. Merton College.  
 M.Fed. Miners' Federation.  
 Mgr. Monseigneur; Monsignor.  
 M.Hon. Most Honourable.  
 M.K.W. Military Knight of Windsor.  
 M.L.A. Modern Language Association.  
 M.M.S. Methodist Missionary Society.  
 M.N. Merchant Navy.  
 M.P. Member of Parliament; Minister Plenipotentiary.  
 M.Phil. Master of Philosophy.  
 M.R. Master of the Rolls.  
 M.R.C. Medical Research Council.  
 M.S. Master of Surgery; Musical Society.  
 M.Sc. Master of Science.  
 M.S.I. Member of the Chartered Surveyors' Institution.  
 M.U. Mothers' Union; Motorists' Union; Musicians' Union.  
 M.V.O. Member of the Royal Victorian Order.  
 M.W. Most Worshipful.  
 M.W.B. Metropolitan Water Board.  
 M.W.F.G.B. Mineworkers' Federation of Great Britain.  
 N.A.L.G.O. National Association of Local Government Officers.  
 N.A.S.U. National Adult Schools Union.  
 N.B.A. North British Academy.  
 N.B.C. National Broadcasting Company (U.S.A.).  
 N.B.L. National Book League.  
 N.B.S. National Broadcasting Service (New Zealand).  
 N.C.C.L. National Council for Civil Liberties.  
 N.C.C.V.D. National Council for Combating Venereal Diseases.  
 N.C.L.C. National Council of Labour Colleges.  
 N.C.S.S. National Council of Social Services.



<b>R.S.C.</b> Royal Society of Canada (F.).	<b>S.A.A.</b> Society of Incorporated Accountants and Auditors (A., F.).	<b>S.S.J.E.</b> Society of S. John Evangelist.	<b>U.N.A.</b> United Nations Association.
<b>R.S.D.</b> Royal Society of Dublin.	<b>S.A.A.A.</b> Scottish Amateur Athletic Association.	<b>S.S.M.</b> Society of the Sacred Mission.	<b>U.N.E.S.C.O.</b> United Nations Educational, Scientific, and Cultural Organization.
<b>R.S.E.</b> Royal Society of Edinburgh (F.).	<b>S.A.C.</b> Scottish Automobile Club.	<b>S.T.B.</b> Bachelor of Sacred Theology.	<b>Univ.</b> University (College).
<b>R.S.G.S.</b> Royal Scottish Geographical Society (F.).	<b>S.A.E.</b> Society of Automobile Engineers.	<b>S.T.D.</b> Doctor of Sacred Theology.	<b>U.N.R.R.A.</b> United Nations Relief and Rehabilitation Administration.
<b>R.S.L.</b> Royal Society, London; Royal Society of Literature (A., F., M.).	<b>S.B.A.C.</b> Society of British Aircraft Constructors.	<b>St. Edm. H.</b> S. Edmund Hall.	<b>U.P.C.</b> United Presbyterian Church.
<b>R.S.M.</b> Royal School of Medicine (F.); Royal School of Mines (A.).	<b>S.B.H.</b> Scottish Board of Health.	<b>T.A.</b> Typographical Association.	<b>U.S.I.</b> United Service Institution.
<b>R.S.P.B.</b> Royal Society for the Protection of Birds.	<b>S.C.</b> Salvage Corps; Supreme Court; Swimming Club.	<b>T. &amp; G.W.U.</b> Transport and General Workers' Union.	<b>U.S. of S.</b> Under-Secretary of State.
<b>R.S.P.C.A.</b> Royal Society for the Prevention of Cruelty to Animals.	<b>S.C.L.</b> Student of Civil Law.	<b>T.C.</b> Town Clerk; Town Councillor; Trinity College; Touring Club.	<b>U.S.S.C.</b> United States Supreme Court.
<b>R.S.P.P.</b> Royal Society of Portrait Painters.	<b>S.C.M.</b> Student Christian Movement.	<b>T.C.D.</b> Trinity College, Dublin (F.).	<b>V.A.</b> Order of Victoria and Albert; Vicar-Apostle.
<b>R.S.S.</b> <i>Regalis Societatis Sodalitas</i> (Latin), Fellow of the Royal Society.	<b>S.C.U.</b> Scottish Cycling Union.	<b>T.C.F.</b> Touring Club of France.	<b>V. &amp; A.</b> Victoria and Albert Museum.
<b>R.S.S.A.</b> Royal Scottish Society of Arts (F.).	<b>S.D.F.</b> Social Democratic Federation.	<b>T.C.L.</b> Trinity College, London (A., F., L.).	<b>V.C.</b> Vice-Chancellor.
<b>R.S.T.</b> Royal Society of Teachers (F., M.).	<b>S.E.</b> Society of Engineers (F.).	<b>T.G.</b> Teachers' Guild.	<b>V.D.</b> Victorian Decoration.
<b>R.S.T.M.H.</b> Royal School of Tropical Medicine and Hygiene (F.).	<b>S.E.C.</b> Stock Exchange Committee.	<b>T.H.</b> Transport House.	<b>Ven.</b> Venerable.
<b>R.S.W.S.</b> Royal Scottish Water-Colour Society (A.).	<b>S.E.D.</b> Scottish Educational Department.	<b>T.I.</b> Technical Institute; Textile Institute (A., F.).	<b>V.H.S.</b> Honorary Surgeon to the Viceroy of India.
<b>R.T.C.</b> Royal Technical College, Glasgow (A.).	<b>S.F.A.</b> Scottish Football Association.	<b>T.I.H.</b> Their Imperial Highnesses.	<b>Vis(ct).</b> Viscount.
<b>R.T.S.</b> Religious Tract Society; Royal Toxophilite Society.	<b>S.G.</b> Solicitor General.	<b>Toe H.</b> Talbot House (Toe T in Morse).	<b>V.M.D.</b> Doctor of Veterinary Medicine.
<b>R.T.Y.C.</b> Royal Thames Yacht Club.	<b>S.I.</b> Star of India.	<b>T.P.I.</b> Town Planning Institute (A., M.).	<b>V.M.H.</b> Victoria Medal of Honour.
<b>R.U.</b> Rugby Union.	<b>S.J.</b> Society of Jesus.	<b>T.R.C.</b> Teachers' Registration Council; Thames Rowing Club.	<b>V.P.</b> Vice-President.
<b>R.U.I.</b> Royal University of Ireland (F.).	<b>S.J.A.A.</b> S. John Ambulance Association.	<b>T.R.H.</b> Their Royal Highnesses.	<b>Wadh.</b> Wadham College.
<b>R.U.S.I.</b> Royal United Service Institution (M.).	<b>S.J.A.B.</b> S. John Ambulance Brigade.	<b>Trin.</b> Trinity College.	<b>W.C.A.</b> Women Citizens' Association.
<b>R.U.S.Mus.</b> Royal United Service Museum.	<b>S.M.</b> Sons of Malta.	<b>T.U.C.</b> Trades Union Congress, or Council.	<b>W.D.</b> War Department; Works Department.
<b>R.V.C.</b> Royal Victorian Chain.	<b>S.M.P.</b> Society of Miniature Painters.	<b>T.W.U.</b> Transport Workers' Union.	<b>W.E.A.</b> Workers' Educational Association.
<b>R.V.C.I.</b> Royal Veterinary College of Ireland.	<b>S.O.</b> Scottish Office; Stationery Office.	<b>T.Y.C.</b> Thames Yacht Club.	<b>W.I.</b> Women's Institute.
<b>R.V.I.A.</b> Royal Victorian Institute of Architects (A., E.).	<b>Som.</b> Somerville College.		<b>W.L.F.</b> Women's Liberal Federation.
<b>R.W.</b> Right Worshipful; Right Worthy.	<b>S.P.C.</b> Society for the Prevention of Crime.		<b>W.O.</b> War Office.
<b>R.W.A.</b> Royal West of England Academy (A.).	<b>S.P.C.K.</b> Society for the Promotion of Christian Knowledge.		<b>Wp.</b> Worship (title).
<b>R.W.S.</b> Royal Society of Painters in Water-Colours (A.).	<b>S.P.E.</b> Society for Pure English.		<b>W.R.U.</b> Welsh Rugby Union.
<b>R.Y.S.</b> Royal Yacht Squadron.	<b>S.P.G.</b> Society for the Propagation of the Gospel.		<b>W.S.</b> Writer to the Signet.
	<b>S.P.R.</b> Society for Psychical Research.		<b>W.T.A.</b> Workers' Travel Association.
	<b>S.P.R.C.</b> Society for the Prevention and Relief of Cancer.		<b>W.U.S.L.</b> Women's United Service League.
	<b>S.P.R.L.</b> Society for the Promotion of Religion and Learning.		
	<b>S.P.V.D.</b> Society for the Prevention of Venereal Disease.		
	<b>S.R.U.</b> Scottish Rugby Union.		
	<b>S.S.</b> Secretary for Scotland; Secretary of State.		
	<b>S.S.C.</b> Sculptural Society of Canada; Solicitor of the Supreme Court.		
<b>S.</b> Preceding other initials, may stand for <i>Sodalitas</i> (Latin), Fellow.			
<b>S.A.</b> Salvation Army; Society of Antiquaries (F.).			

### Section III. WAR, THE SERVICES, CIVIL DEFENCE

*The abbreviations that follow are those used by the Navy, Army, the Air Forces, and by the various Civil Defence and other associated Services in wartime. The list is necessarily selective though comprehensive. Decorations with both civilian and military classes are given in Section II.*

<b>A.</b> Acting; administration; assistant; Auxiliary Air Force; Naval Aviation.	<b>A.A.S.</b> Auxiliary Ambulance Service.	<b>A/C.</b> Aircraft.	<b>A.C.W.</b> Aircraftwoman.
<b>A.A.</b> Anti-aircraft; Army Act.	<b>A.A.S.C.</b> Army Air Support Control.	<b>A.C.1.</b> Aircraftman, 1st Class.	<b>A.C.W.1.</b> Aircraftwoman, 1st Class.
<b>A.A.C.</b> Army Air Corps.	<b>A.B.</b> Able-bodied (seaman); Army Book.	<b>A.C.2.</b> Aircraftman, 2nd Class.	<b>A.C.W.2.</b> Aircraftwoman, 2nd Class.
<b>A.A.C.U.</b> Anti-Aircraft Co-operation Unit.	<b>A.B.C.</b> Air Booking Centre.	<b>A.C.C.</b> Army Catering Corps.	<b>A.D.</b> Air dispatch; armoured division; assistant director.
<b>A.A.D.C.</b> Anti-Aircraft Defence Commander.	<b>A.B.C.A.</b> Army Bureau of Current Affairs.	<b>A.Cdre.</b> Air Commodore.	<b>A.D.C.</b> Aide-de-camp; Army Dental Corps.
<b>A.A.F.</b> Auxiliary Air Force.	<b>A.B.C.D.</b> America, Britain, China, Dutch East Indies.	<b>A.Cdt.</b> Air Commandant (W.R.A.F.).	<b>A.D.D.L.</b> Airfield Dummy-Deck Landing.
<b>A.A.G.</b> Assistant Adjutant-General.	<b>A.B.D.A.</b> American-British-Dutch-Australian area.	<b>A.C.F.</b> Army Cadet Force.	<b>A.D.G.B.</b> Air Defence of Great Britain.
<b>A.A.L.M.G.</b> Anti-aircraft light machine-gun.	<b>A.B.P.O.</b> Army Base Post Office.	<b>A.C/H.</b> Aircraftman.	<b>Adj.</b> Adjutant.
<b>A. &amp; A.E.E.</b> Aircraft and Armament Experimental Establishment.	<b>A.B.T.S.</b> Army Blood Transfusion Service.	<b>A.C.I.</b> Air Council Instruction; Army Council Instruction.	<b>Adm.</b> Administration; Admiral(ity).
<b>A.A.Q.M.G.</b> Assistant Adjutant and Quartermaster-General.	<b>A.C.</b> Aircraft carrier; aircraftman; armoured car; army cooperation.	<b>Ack.</b> Acknowledge.	<b>A.D.M.S.</b> Assistant Director of Medical Services.
		<b>A.C.M.</b> Air Chief Marshal.	<b>A.D.O.S.</b> Assistant Director of Ordnance Services.
		<b>A.C.S.E.A.</b> Air Command, South-East Asia.	
		<b>A.C.V.</b> Armoured command vehicle.	



- D.C.L.I.** Duke of Cornwall's Light Infantry.  
**D.C.M.** Distinguished Conduct Medal; District Court Martial.  
**D.C.O.** Dental Clerk Orderly.  
**D.C.T.** Depth-charge thrower.  
**D.C.W.** Department of Chemical Warfare.  
**D.D.** Deputy director; Duplex Drive.  
**D.E.M.S.** Defensively equipped merchant ship.  
**Det.** Detached; detachment; detonator.  
**D.F.** Defensive fire; destroyer flotilla; direction finder (-ing).  
**D.F.C.** Distinguished Flying Cross.  
**D.F.M.** Distinguished Flying Medal.  
**D.F.Ops.** Director of Fighter Operations.  
**D.G.** Degaussing; Director-General; Dragoon Guards.  
**D.G.D.** Director of Ground Defence (R.A.F.).  
**D.G.M.S.** Director-General of Medical Services.  
**D.G.O.** Director-General of Organization.  
**D.G.P.** Director-General of Production.  
**D.G.R.** Director(-General) of Graves Registration.  
**D.G.R.D.** Director-General of Research and Development.  
**D.G.S.** Director-General of Signals.  
**D.G.Tn.** Director-General of Transportation Services.  
**D.G.W.I.P.** Director-General of Weapons and Instruments Production.  
**D.H.** Director of Hygiene.  
**D.Hgs.** Director of Hirings Service.  
**D.I.** Daily Inspection.  
**Div.** Division.  
**D.I.W.T.** Director of Inland Water Transport Service (Army).  
**D.Lab.** Director of Labour.  
**D.L.C.O.** Deck Landing Control Officer.  
**D.L.I.** Durham Light Infantry.  
**D.M.** Diphenyl-amine-chloroarsine; Director of Mechanisation.  
**D.M.C.** Director of Military Cooperation.  
**D.M.I.** Director of Military Intelligence.  
**D.M.O.** Director of the Meteorological Office (R.A.F.).  
**D.M.O.I.** Director of Military Operations and Intelligence.  
**D.M.Q.** Director of Movements and Quartering.  
**D.M.S.** Director of Medical Services (Army).  
**D.M.T.** Director of Military Training; driver, mechanical transport.  
**D.N.A.** Director of Naval Accounts.  
**D.N.A.D.** Director of Naval Air Division.  
**D.N.E.** Director of Naval Equipment.  
**D.N.F.T.U.** Day-Night Flying Training Unit.  
**D.N.I.** Director of Naval Intelligence.  
**D.N.M.S.** Director of Naval Medical Services.  
**D.N.R.** Director of Naval Recruiting.  
**Do.** Dornier.  
**D.O.** Demi-official; Director of Organization; Divisional Order.  
**D.O.D.** Director of Operations Division (R.N.).  
**D.O.I.O.** Director of Intelligence, Operations (R.A.F.).  
**D.O.I.S.** Director of Intelligence, Security (R.A.F.).  
**D.O.M.** Director of Manning.  
**D.O.N.** Director of Navigation.  
**D.O.S.** Director of Signals (R.A.F.).  
**D.P.** Deep penetration; delivery point; dispersal point; displaced person; drill purposes; Duty Pilot.  
**D.P.R.** Director of Public Relations (R.A.F.).  
**D.P.S.** Director of Personal Services.  
**D.R.** Dead reckoning; dispatch rider.  
**D.R.L.S.** Dispatch Rider Letter Service.  
**D.R.O.** Daily (or Divisional) Routine Order.  
**D.S.** Decontamination Squad; Directing Staff.  
**D.S.C.** Distinguished Service Cross.  
**D.S.C.D.** Director of Small Craft Disposals.  
**D.S.E.A.** Davis submarine escape apparatus.  
**D.S.M.** Director of Servicing and Maintenance (R.A.F.); Distinguished Service Medal.  
**D.S.O.** Distinguished Service Order.  
**D.S.R.** Director of Scientific Research.  
**D.T.A.C.F.** Director Territorial Army and Cadet Force.  
**D.T.D.** Department of Technical Development.  
**D.T.F.** Director of Flying Training (R.A.F.).  
**D.T.O.** Director of Operational Training (R.A.F.).  
**D.T.T.** Director of Technical Training (R.A.F.).  
**Dvr.** Driver.  
**D.W.A.A.F.** Director of Women's Auxiliary Air Force.  
**D.W.D.** Director of Weapon Development.  
**D.Z.** Dropping zone.  
**E.** Engineer; equipment.  
**E.A.** Egyptian Army; enemy aircraft; Engineer Admiral (R.N.).  
**E.A.A.S.** Empire Air Armament School.  
**E.A.M.** *Ethnikon Apoliftherotikon Metapon* (Gr.), National Liberation Front.  
**E.A.N.S.** Empire Air Navigation School.  
**E.C.** Engineer Captain (R.N.); Escort carrier.  
**E.C.F.S.** Empire Central Flying School.  
**Ech.** Echelon.  
**E.D.** Efficiency Decoration.  
**E.F.** Expeditionary Force.  
**E.F.I.** Expeditionary Forces Institutes.  
**E.F.M.** Expeditionary Forces Message.  
**E.F.T.S.** Elementary Flying Training School; Empire Flying Training School.  
**E.G.M.** Empire Gallantry Medal.  
**E-in-C.** Engineer-in-Chief of the Fleet.  
**E.L.A.S.** *Ethnikos Laikos Apoliftherotikos Stratos* (Gr.), National Popular Liberation Army.  
**E.L.Cr.** Engineer Lieutenant-Commander.  
**E.L.S.** Express Letter Service.  
**E.M.S.** Emergency Medical Service.  
**Eng.** Engineer.  
**E.N.S.A.** Entertainments National Service Association.  
**E.O.** Education (Engineer, Entertainments, Equipment or Establishments) Officer.  
**E.R.A.** Engine-Room Artificer.  
**E.R.S.** Empire Radio School.  
**E.S.O.** Embarkation Staff Officer.  
**Estabs.** Establishments.  
**E.T.A.** Estimated time of arrival.  
**E.T.C.** Emergency Training Centre.  
**E.T.D.** Estimated time of departure.  
**E.T.O.** European Theatre of Operations.  
**E.T.P.S.** Empire Test Pilots' School.  
**E.V.T.** Educational and Vocational Training.  
**E.W.S.** Emergency water supply.  
**F.** Fighter; photographic aircraft (U.S.).  
**F.A.A.** Fleet Air Arm.  
**F.A.M.O.** Forward Airfield Maintenance Organization.  
**F.A.N.Y.** First Aid Nursing Yeomanry.  
**F.A.P.** First Aid Party (or Post).  
**F.A.U.** Friends' Ambulance Unit.  
**F.B.** Fighter-bomber; fire brigade; flying-boat.  
**F.C.** Fire control; fleet carrier.  
**F.C.O.** Flying Control Officer.  
**F.C.P.** Forward Control Post.  
**Fd.** Field.  
**F.D.B.** Fighter dive-bomber.  
**F.D.L.** Forward defended localities.  
**F.E.** Flight Engineer.  
**F.E.U.** Forward Equipment Unit.  
**F.F.** Free French; Frontier Force.  
**F.F.F.** Fighting French Forces.  
**F.F.I.** Free from infection; French Forces of the Interior.  
**F.G.** Fire Guard; Foot Guards.  
**F.G.C.M.** Field General Court Martial.  
**FIDO.** Fog Investigation Dispersal Operation.  
**F.L.** Flight Lieutenant.  
**Flak.** *Fliegerabwehrkanone* (Ger.), anti-aircraft fire.  
**Flt.** Flight.  
**Flt. O.** Flight Officer (W.R.A.F.).  
**F.M.** Field Marshal; Flight Mechanic.  
**Fmn.** Formation.  
**F.M.O.** Fleet Mail Officer.  
**F.O.** Flag Officer; Flying Officer.  
**F.O.I.C.** Flag Officer in Charge.  
**F.O.O.** Forward Observation Officer.  
**F.P.** Field punishment; fire picket.  
**F.P.O.** Field Post Office.  
**F.R.** Fighter reconnaissance.  
**F.S.** Field security; field service; Fleet Surgeon; Flight Sergeant.  
**F.S.M.O.** Field Service Marching Order.  
**F.S.O.** Field Security Officer.  
**F.S.P.** Field Security Personnel.  
**F.S.P.B.** Field Service Pocket Book.  
**F.S.R.** Field Service Regulations.  
**F.T.B.** Fleet torpedo bomber.  
**F.T.O.** Fleet torpedo officer.  
**F.T.S.** Flying Training School.  
**Fus.** Fusilier.  
**Fw.** Focke-Wulf.  
**F.W.** Fair-weather.  
**Fwd.** Forward.  
**G.** General Staff.  
**G.A.F.** German Air Force.  
**G.B.** Gunboat.  
**G.C.** Gentleman Cadet; George Cross; Group Captain.  
**G.C.A.** Ground-controlled approach (radar).  
**G.C.C.** Group Control Centre.  
**G.C.I.** Ground-controlled interception (radar).  
**G.C.M.** General Court Martial.  
**G.D.** General duties; ground defence.  
**Gdsman.** Guardsman.  
**G.E.** Garrison Engineer; Ground Engineer.  
**Gen.** General.  
**G.G.** Grenadier Guards.  
**G.H.Q.** General Headquarters.  
**G.I.** General (or Government) Issue (U.S.), hence, colloquially, a U.S. soldier.  
**G.L.** Gun layer; gun-laying (radar).  
**G.M.** George Medal.  
**Gnr.** Gunner.  
**G.N.T.C.** Girls' Nautical Training Corps.  
**G.O.C.(-in-C.).** General Officer Commanding (-in-Chief).  
**G.O.R.** Gun Operations Room.  
**G.P.** General purposes.  
**Gp.Capt.** Group Captain.  
**G.P.O.** Gun Position Officer.  
**G.P.R.** Glider Pilot Regiment.  
**G.P.T.** General Purpose Transport.  
**G.R.** General reconnaissance; Gurkha Rifles.  
**G.R.O.** General Routine Order.  
**G.S.** General service; General Staff.  
**G.S.C.** General Service Corps.  
**G.S.O.** General Staff Officer.  
**G.S.P.** Good service pension.  
**G.T.** Glider tug.  
**G.T.C.** Girls' Training Corps.  
**G.T.V.** Gun-towing vehicle.  
**H.A.** High-angle.  
**H.A.A.** Heavy anti-aircraft.  
**H.A.C.** Honourable Artillery Company.  
**H.C.F.** Honorary Chaplain to the Forces.  
**H.D.** Heavy duty; Highland Division; Home Defence; horse drawn.  
**He.** Helmet.  
**H.E.** High explosive.  
**H.F.** High-level fighter; Home Fleet; Home Forces.  
**H.G.** Home Guard; Home Guards.  
**H.L.I.** Highland Light Infantry.  
**H.M.A.C.** His Majesty's Aircraft Carrier.  
**H.M.A.S.** His Majesty's Australian Ship.  
**H.M.C.S.** His Majesty's Canadian Ship.  
**H.M.F.** His Majesty's Forces.  
**H.M.I.S.** His Majesty's Indian Ship.

- O.O.** Observation Officer; Operation Order; Orderly Officer; Ordnance Officer.  
**O.O.W.** Officer of the Watch.  
**O.P.** Observation post.  
**Ops.** Operations.  
**O.R.** Operations room; orderly room; other rank.  
**Orbat.** Order of battle.  
**Ord.** Ordnance.  
**O.R.S.** Orderly Room Sergeant.  
**O.S.** Ordinary Seaman, ordnance services.  
**O.S.S.** Office of Strategic Services (U.S.).  
**O.T.C.** Officers' Training Corps.  
**O.T.S.** Officers' Training School.  
**O.T.U.** Operational Training Unit.  
**O2E.** Officer in charge of 2nd Echelon.  
**O.U.A.S.** Oxford University Air Squadron.  
**O.W.I.** Office of War Information (U.S.).  
**O.W.L.** Operator, wireless and line.
- P.** Patrol-boat; personnel branch (R.A.F.); pursuit aircraft (U.S.).  
**p.a.c.** Passed advanced class, Military College of Science.  
**P.A.C.U.** Parachute and Cable Unit.  
**P.A.D.** Passive air defence.  
**Paiforce.** Persia and Iraq Force.  
**Paymr.** Paymaster.  
**P.B.** Patrol boat; patrol bomber.  
**P.B.I.** "Poor bloody infantry."  
**P.C.** Paymaster Captain (R.N.); Paymaster Commander.  
**P.D.C.** Personnel Disposal Centre.  
**P.D.G.** Paymaster Director-General.  
**Pdr.** Pounder (guns).  
**Pfc.** Private first-class (U.S.).  
**P.F.F.** Pathfinder Force.  
**P.H.** Purple Heart (U.S. decoration).  
**P.I.** Point of Impact.  
**P.I.A.T.** Projector, infantry, anti-tank.  
**Pl.** Platoon.  
**P.L.** Paymaster-Lieutenant; plain language.  
**Plt.** Pilot.  
**PLUTO.** Pipe-line under the ocean.  
**P.M.** Paymaster; Provost-Marshal.  
**P.M.C.** President of the Mess Committee.  
**P.M.R.A.F.N.S.** Princess Mary's Royal Air Force Nursing Service.  
**P.O.** Petty Officer; Pilot Officer; Plotting Officer.  
**P.O.L.** Petrol, oil, and lubricants.  
**P.O.R.** Personnel Occurrence Report.  
**P.O.Tel.** Petty Officer Telegraphist.  
**P.O.W.** Prisoner of war.  
**P.P.** Petrol point.  
**P.P.I.** Plan position indicator (radar).  
**P.R.** Parachute Regiment; photographic reconnaissance; public relations.  
**P.R.A.** Paymaster Rear-Admiral.  
**P.R.I.** President of the Regimental Institute.  
**Pro.** Provost.
- P.R.O.** Public Relations Officer.  
**P.R.P.** Petrol refilling point.  
**P.R.U.** Photographic Reconnaissance Unit.  
**p.s.a.** Passed R.A.F. Staff College.  
**p.s.c.** Passed Staff College.  
**P.S.I.** Permanent staff instructor; President of the Services Institute.  
**P.S.L.** Paymaster Sub-Lieutenant.  
**P.S.T.O.** Principal Sea Transport Officer.  
**P.T.** Physical Training.  
**Pte.** Private.  
**P.T.I.** Physical Training Instructor.  
**p.u.n.s.** Permanently unfit for naval service.  
**P.V.** Paravane; patrol vessel; private venture.  
**P.W.** Prisoner of war.  
**P.W.C.** Post-War Credit.  
**P.W.R.** Police War Reserve.  
**P.X.** Post Exchange (U.S.).  
**Pz.Kw.** *Panzerkraftwagen* (Ger.), tank.
- Q.** Quartermaster's Branch.  
**Q.A.I.M.N.S.** Queen Alexandra's Imperial Military Nursing Service.  
**Q.A.R.N.N.S.** Queen Alexandra's Royal Naval Nursing Service.  
**Q.D.** Quarter Deck.  
**Q.E.** Quadrant elevation.  
**Q.F.** Quick-firing.  
**Q.M.** Quartermaster; Queen's Messenger.  
**Q.M.A.A.C.** Queen Mary's Army Auxiliary Corps.  
**Q.M.G.** Quartermaster-General.  
**Q.M.S.** Quartermaster-Sergeant.  
**Q.O.** Qualified in Ordnance.
- R.** Reconnaissance; rescue; reserve; rigid airship.  
**R.A.** Rear-Admiral; Royal Artillery.  
**R.A.(A.).** Rear-Admiral of Aircraft Carriers.  
**R.A.A.F.** Royal Australian Air Force.  
**R.A.C.** Royal Armoured Corps.  
**R.A.Ch.D.** Royal Army Chaplain's Department.  
**R.A.(D.).** Rear Admiral of Destroyers.  
**R.A.D.C.** Royal Army Dental Corps.  
**R.Adm.** Rear-Admiral.  
**R.A.E.** Royal Aircraft Establishment.  
**R.A.E.C.** Royal Army Educational Corps.  
**R.A.F.** Royal Aircraft Factory; Royal Air Force.  
**R.A.F.O.** Reserve of Air Force Officers.  
**R.A.F.R.** Royal Air Force Regiment.  
**R.A.F.V.R.** Royal Air Force Volunteer Reserve.  
**R.A.M.C.** Royal Army Medical Corps.  
**R.A.M.O.** Rear Airfield Maintenance Organization.  
**R.A.N.** Royal Australian Navy.  
**R.A.O.C.** Royal Army Ordnance Corps.  
**R.A.P.** Regimental aid post.  
**R.A.P.C.** Royal Army Pay Corps.  
**R.A.P.W.I.** Repatriation of Allied Prisoners of War and Internees.  
**R.A.R.O.** Regular Army Reserve of Officers.
- R.A.S.C.** Royal Army Service Corps.  
**R. Aux. A.F.** Royal Auxiliary Air Force.  
**R.A.V.C.** Royal Army Veterinary Corps.  
**R.B.** Rifle Brigade.  
**R.C.** Recruiting centre; Red Cross.  
**R.C.A.F.** Royal Canadian Air Force.  
**R.C.M.** Regimental Corporal-Major (Household Cavalry).  
**R.C.N.** Royal Canadian Navy.  
**R.C.N.C.** Royal Corps of Naval Constructors.  
**R.C.S.** Royal Corps of Signals.  
**R.D.** Royal Naval Reserve Decoration.  
**R.D.F.** Radio direction-finder(-ing).  
**R.D.X.** Research Department Formula X (explosive).  
**R.D.Y.** Royal Dockyard.  
**R.E.** Royal Engineers.  
**Recco.** Reconnaissance.  
**Ref.** Reference.  
**Regt.** Regiment.  
**R.E.M.E.** Royal Electrical and Mechanical Engineers.  
**Res.** Reserve.  
**R.E.S.** River Emergency Service.  
**R.F.** Range-finder; Royal Fusiliers.  
**R.F.A.** Royal Field Artillery.  
**R.F.C.** Royal Flying Corps.  
**Rfn.** Rifleman.  
**R.G.A.** Royal Garrison Artillery.  
**R.G.B.** River Gunboat (R.N.).  
**R.H.A.** Royal Horse Artillery.  
**R.H.Q.** Regimental Headquarters.  
**R.I.** Rigorous Imprisonment.  
**R.I.A.F.** Royal Indian Air Force.  
**R.I.F.** Royal Inniskilling Fusiliers; Royal Irish Fusiliers.  
**R.I.N.** Royal Indian Navy.  
**R/L.** Radiolocation.  
**R.M.** Royal Marines.  
**R.M.A.** Royal Marine Artillery; Royal Military Academy.  
**R.M.C.** Royal Military College.  
**R.M.P.** Regimental medical post; Royal Marine Police.  
**R.N.** Royal Navy.  
**R.N.A.S.** Royal Naval Air Service.  
**R.N.C.** Royal Naval College.  
**R.N.D.** Royal Naval Division.  
**R.N.R.** Royal Naval Reserve.  
**R.N.S.C.** Royal Naval Staff College.  
**R.N.S.S.** Royal Naval Scientific Service.  
**R.N.V.R.** Royal Naval Volunteer Reserve.  
**R.N.V.S.R.** Royal Naval Volunteer Supplementary Reserve.  
**R.N.Z.A.F.** Royal New Zealand Air Force.  
**R.N.Z.N.** Royal New Zealand Navy.  
**R.O.** Recruiting Officer; Reserve of Officers; Routine Order.  
**R.O.C.** Royal Observer Corps.  
**R.O.F.** Royal Ordnance Factory.  
**R.O.O.** Railhead Ordnance Officer.  
**R.O.S.** Regimental Orderly Sergeant.  
**R.P.** Refuelling point; rescue party; rocket projectile; Rules of Procedure.
- R.P.C.** Royal Pioneer Corps.  
**R.p.g.** Rounds per gun.  
**R.P./H.** Repairs Party, Heavy.  
**R.P./L.** Repairs Party, Light.  
**R.P.O.** Regulating Petty Officer.  
**Rptd.** Repeated.  
**R.Q.M.C.** Regimental Quartermaster-Corporal.  
**R.Q.M.S.** Regimental Quartermaster-Sergeant.  
**R.R.C.** Royal Red Cross.  
**R.S.D.** Rescue Service and Demolition.  
**R.S.F.** Royal Scots Fusiliers.  
**R.Sigs.** Royal Corps of Signals.  
**R.S.M.** Regimental Sergeant-Major.  
**R.S.M.S.** Rendering Safe of Mines Squad.  
**R.S.R.** Radding Support Regiment (Artillery).  
**R.S.U.** Repair and Salvage Unit.  
**R/T.** Radio telephony.  
**R.Tanks or R.T.C.** Royal Tank Corps.  
**R.T.O.** Railway Transport Officer.  
**R.T.R.** Royal Tank Regiment.  
**R.T.U.** Returned to unit.  
**R.U.** Ready-use.  
**R.U.R.** Royal Ulster Rifles.  
**R.V.** Rendezvous.  
**R.W.** Royal Warrant.  
**R.W.A.F.F.** Royal West African Frontier Force.  
**R.W.F.** Royal Welsh Fusiliers.
- S.** Signals.  
**S.A.** Semi-automatic; supply assistant (R.N.).  
**S.A.A.** Small arms ammunition.  
**S.A.A.A.** School of Anti-Aircraft Artillery.  
**S.A.A.F.** South African Air Force.  
**S.A.C.S.E.A.** Supreme Allied Commander, South East Asia.  
**S.A.D.F.** South African Defence Force.  
**S. & T.** Supply and Transport.  
**S.A.N.S.** South African Naval Service.  
**S.A.P.** Semi-armour-piercing.  
**S.A.R.** School of Aircraft Recognition.  
**S.A.S.** School of Air Support; Special Air Service.  
**S.A.S.O.** Senior Air Staff Officer.  
**S.B.** Signal boatswain; stretcher-bearer.  
**S.B.A.** Sick-bay attendant.  
**S.C.** Small craft; Staff Captain; Staff College.  
**S.C.C.** Sea Cadet Corps.  
**S.Cdr.** Senior Commander (W.R.A.C.).  
**S.C.F.** Senior Chaplain to the Forces.  
**S.D.** Service dress; special duties; staff duties; supply dropping.  
**S.D.O.** Senior Dental Officer; Signal Distributing Office.  
**S/E.** Single-engined.  
**S.E.A.A.F.** South-East Asia Air Forces.  
**S.E.A.C.** South-East Asia Command.  
**S.E.A.L.F.** South-East Asia Land Forces.  
**Sec.Lt.** Second-Lieutenant.  
**S.Eq.S.O.** Senior Equipment Staff Officer.

- C.** Calorie, large; capacitance; capacity; carbon; centigrade; coulomb.  
**c.** Calorie, small; current; velocity of light in vacuo.  
**Ca** Calcium.  
**cal.** Calorie.  
**Cb** Columbium.  
**C.B.** Central battery.  
**C.C.** Continuous current.  
**c.c.** Cotton covered; cubic centimetre.  
**Cd** Cadmium.  
**Ce** Cerium.  
**cel.** Cellulose.  
**C.G.** Centre of gravity.  
**cg.** Centigramme.  
**C.G.I.** Corrugated galvanised iron.  
**C.G.S.** Centimetre-gramme-second (system of units).  
**C.I.** Cast iron; compression ignition.  
**C.I.E.** Compression ignition engine.  
**Cl** Chlorine.  
**cm.** Centimetre.  
**Cn** Cyanogen.  
**Co** Cobalt.  
**cos.** Cosine.  
**cosec.** Cosecant.  
**cot.** Cotangent.  
**c.p.** Candle power.  
**c.p.s.** Cycles per second.  
**Cr** Chromium.  
**C.R.** Cold rolled; compression ratio; copper resistance.  
**cr.p.** Critical pressure.  
**cr.t.** Critical temperature.  
**Cs** Caesium.  
**Cu** Copper.  
**c.w.** Continuous wave.  
**D.** Deuterium; electric flux density.  
**d.** Diopter; dorsal.  
**d.** Specific gravity (chem.).  
**db.** Decibel.  
**D.C.** Direct current; standard thickness of tinplate.  
**d.c.c.** Double cotton covered.  
**DDT.** Dichloro-diphenyl-trichlorethane (insecticide).  
**D.F.** Direction finder (-ing).  
**Di** Didymium.  
**D.P.** Double-pole.  
**D.P.C.** Damp-proof course.  
**d.s.c.** Double silk covered.  
**D.T.** Double throw.  
**Dy** Dysprosium.  
**E.** Earth; elasticity modulus; electro-motive force; illumination; permittivity; voltage.  
**e.** Base of logarithms; charge on electron; elasticity coefficient; strain.  
 **$\epsilon$  (epsilon).** Dielectric constant; electric force; electrode potential.  
**E.D.** Electro-dynamic.  
**E.H.P.** Effective horse power; electrical horse power; extra high pressure.  
**E.H.T.** Extra high tension.  
**el.** Element.  
**e.m.f.** Electro-motive force.  
**E.M.U.** Electro-magnetic unit.  
**Er** Erbium.  
**E.S.U.** Electro-static unit.  
**Eu** Europium.  
**F.** Fahrenheit; farad; fluorine; force; luminous flux.  
**f.** Frequency; function; focal aperture of lens shutter.  
**Fe** Iron.  
**f.h.p.** Fractional horse power.  
**f.** Fluid.  
**F.M.** Frequency modulation.  
**f.p.** Freezing point.  
**F.P.S.** Foot-pound-second (system of units).  
**Fr** Florentium.  
**freq.** Frequency.  
**F.S.** Factor of safety.  
**f.s.** Foot-seconds.  
**F.W.G.** French wire gauge.  
**G.** Centre of gravity; gully; leakage.  
**g.** Acceleration due to gravity; conductance; gramme; gravitation.  
 **$\gamma$  (gamma).** Gamma rays (radioactive).  
**Ga** Gallium.  
**Gd** Gadolinium.  
**Ge** Germanium.  
**Gl** Glucinum.  
**H.** Henry (unit of inductance); horizontal component of intensity of magnetisation; hydrogen.  
**H.** Henry (unit of inductance).  
**H. and D.** Hurter and Drift-field curve (speed of photographic films).  
**H.E.** Heat engine; horizontal equivalent; hydraulics engineer.  
**He** Helium.  
**Hf** Hafnium.  
**H.F.** High frequency.  
**H.F.C.** High frequency current.  
**Hg** Mercury.  
**H.M.D.** Hydraulic mean depth.  
**Ho** Holmium.  
**H.P.** Horse power.  
**H.T.** High tension.  
**H.V.** High voltage.  
**I.** Current; inertia; iodine; luminous intensity.  
**i.** Angle of incidence; electric current; intermittent.  
**I.C.E.** Internal-combustion engine.  
**I.F.** Intermediate frequency.  
**I.H.P.** Indicated horse power.  
**Il** Ilyrium.  
**In** Indium.  
**I.P.** Input primary.  
**Ir** Iridium.  
**I.S.** Input secondary.  
**isot.** Isotope; isotopic.  
**J.** Intensity of magnetisation; joule.  
**K.** Potassium.  
**K.** Dielectric constant.  
**k.** Magnetic susceptibility; radius of gyration.  
**kc.** Kilocycle.  
**kcs.** Kilocycles per second.  
**Kg.-cal.** Kilogramme-calorie.  
**kin.** Kinetle.  
**Km.** Kilometre.  
**Kr** Krypton.  
**kV.** Kilovolt (1,000 volts).  
**kVA.** Kilovolt-ampere (1,000 volt-amperes).  
**kVAR.** Kilovar (reactive or wattless kVA).  
**kW.** Kilowatt (1,000 watts).  
**kWh.** Kilowatt hour (1,000 watt-hours).  
**L.** Self-inductance (coefficient); quantity of light.  
 **$\lambda$  (lambda).** Friction angle; wavelength.  
**La** Lanthanum.  
**lat. ht.** Latent heat.  
**ld.** Load.  
**L.F.** Low frequency.  
**Li** Lithium.  
**log.** Logarithm.  
**L.T.** Low tension.  
**Lu** Lutetium.  
**L.W.** Lime white.  
**Ly.** Light-year.  
**M.** Mach number; mass; mutual inductance; 1,000.  
**m.** Metre; minim; minute (time or angle); momentum; strength of magnetic pole; mile.  
 **$\mu$  (mu).** Friction coefficient; micron; permeability (magnetism); refractive index.  
**Ma** Masurium.  
**M.A.** Mechanical advantage.  
**mA.** Millampere.  
**met.** Metal; meteorological.  
 **$\mu F$**  Microfarad.  
**Mg** Magnesium; milligramme.  
**mho.** Unit of conductivity.  
**mH.** Microhenry.  
**mil.** Unit of angular measurement; 1/1,000 inch (in F.P.S. system).  
**mist.** *Mistura* (Latin), mixture.  
**M.K.S.** Metre-kilogramme-second (system of units).  
**mm.** Millimetre.  
**m.m.f.** Magneto-motive force.  
**Mn** Manganese.  
**Mo** Molybdenum.  
**mol.** Molecule.  
**MVA.** 1,000 kVA (1 million volt-amperes).  
**M.W.** Molecular weight.  
**M $\Omega$ .** Megohm.  
**N** Nitrogen.  
**Na** Sodium.  
**N.A.** Neutral axis.  
**Nb** Niobium.  
**Nd** Neodymium.  
**Ne** Neon.  
**N.G.** Nitro-glycerin.  
**Ni** Nickel.  
**N.I.** Non-inductive.  
**nit.** Nitrate; nitric.  
**Nt** Niton.  
**N.T.P.** Normal temperature and pressure.  
**nuc.** Nucleus.  
**O** Oxygen.  
 **$\Omega$  (omega).** Ohm.  
**O.H.** Overhead transmission.  
**O.H.V.** Overhead valve.  
**O.P.** Output primary.  
**orb.** Orbital.  
**Os** Osmium.  
**O.S.** Output secondary.  
**ox.** Oxalate; oxide.  
**Oz.** Ozone.  
**P.** Phosphorus; pitch (of gears); power; pressure per unit area.  
**p.** Particle.  
 **$\pi$  (pi).** Ratio of diameter to circumference ( $3 \cdot 14159 \dots$ ).  
**Pa** Protactinium.  
**P.A.B.X.** Private automatic branch exchange.  
**Pb** Lead (metal).  
**P.B.X.** Private branch exchange.  
**P.C.** Portland cement; prime cost.  
**Pd** Palladium.  
**P.D.** Potential difference.  
**P.E.(C).** Photo-electric cell.  
**pH.** Hydrogen-ion concentration.  
**Po** Polonium.  
**pot.** Potential.  
**Pr** Praseodymium; proton.  
**Pt** Platinum.  
**P.V.C.** Polyvinyl chloride (class of plastics).  
**P.X.** Private exchange.  
**Q.** Charge; quantity (of electricity).  
**R.** Réaumur; resistance.  
**r.** Radius.  
**Ra** Radium.  
**rad.** Radial; radiation; radio; radius; root.  
**Rb** Rubidium.  
**RDX.** Ammonium picrate (explosive).  
**Re** Rhenium.  
**R.F.** Radio-frequency.  
**Rh** Rhodium; in Rh. positive, Rh. negative, Rhesus.  
**R.I.** Refractive index.  
**R.M.S.** Root mean square.  
**Rn** Radon.  
**r.p.m., r.p.s.** Revolutions per minute, per second.  
**R.S.B.** Rolled steel beam.  
**R.S.J.** Rolled steel joist.  
**R./T.** Radiotelephony.  
**Ru** Ruthenium.  
**S.** Sulphur.  
**Sa** Samarium.  
**Sb** Antimony.  
**Sc** Scandium.  
**s.c.** Silk covered; stopcock; super-calendered.  
**s.c.c.** Single cotton covered.  
**Se** Selenium.  
**S.E.** Stopped end.  
**S.G.** Specific gravity.  
**s.h.p.** Shaft horse power.  
**Si** Silicon.  
**Sm** Samarium.  
**Sn** Tin.  
**S.P.** Single-pole; soil-pipe.  
**Sr** Strontium.  
**S.R.** Specific resistance.  
**s.s.c.** Single silk covered.  
**S.T.** Single throw.  
**s.t.** Stale thrust.  
**S.W.G.** Imperial standard wire gauge.  
**T.** Period; transmission factor.  
**t.** Time.  
**Ta** Tantalum.  
**tan.** Tannin.  
**Tb** Terbium.  
**T.D.C.** Top dead centre.  
**Te** Tellurium.  
**Th** Thorium.  
**Ti** Titanium.  
**Tl** Thallium.  
**Tm** Thulium.  
**T.N.C.** Tri-nitro-cellulose.  
**T.N.P.** Tri-nitro-phenol.  
**T.N.T.** Tri-nitro-toluol.  
**T.P.** Triple-pole.  
**t.p.i.** Teeth (threads) per inch.  
**T.V.R.** Temperature variation of resistance.  
**U** Uranium.  
**V.** Potential difference; vanadium; volt; volume.  
**v.** Specific volume; vector; velocity.  
**V.A.** Volt-ampere.  
**val.** Valency.  
**Vi** Virginium.  
**V.I.** Vertical interval.  
**V.I.R.** Vulcanised India-rubber.  
**V.P.** Vanishing point; ventilating pipe.  
**V.R.** Velocity ratio.  
**W.** Tungsten; watt; weight.  
**w.g.** Wire gauge.  
**Wh.** Watt-hour.  
**W/L.** Wavelength.  
**W.T.** Wireless telegraphy.  
**X.** Reactance.  
**x.** Mass susceptibility.  
**Xe** Xenon.  
**X's.** Atmospheres.  
**x tgd.** Cross tongued.  
**Y.** Admittance; yttrium.  
**Yb** Ytterbium.  
**Yt** Yttrium.  
**Z** Impedance.  
**Zn** Zinc.  
**Zr** Zirconium.



visiting London and Paris. His incapacity and extravagance provoked discontent. He was deposed May 30, 1876, and found dead in his apartments June 4, 1876.

**Abdul Aziz.** King of Saudi Arabia. See Ibn Saud.

**Abdul Hamid I** (1725-89). Sultan of Turkey. Son of Sultan Ahmed III, he was born May 20, 1725, and succeeded his brother Mustapha III 1773. Next year the Turkish army was defeated by the Russians, and on July 21 Abdul Hamid signed the treaty of Kuchuk Kainarji, involving the loss of Turkish suzerainty over the Crimea and other Tartar districts. Another war resulted in the loss of Ochakov, 1788. Abdul Hamid died April 7, 1789.

**Abdul Hamid II** (1842-1918). Sultan of Turkey. Born Sept. 22, 1842, second son of the Sultan Abdul Mejid, he became sultan on Aug. 31, 1876, on the deposition of his brother Murad V. His long reign witnessed many changes in



Abdul Hamid II,  
Sultan of Turkey

Turkey, mainly losses of territory and increased foreign control over the Ottoman government and finances. A clever diplomatist, he skillfully played off the Powers of Europe against one another, but his empire was always in disorder, and the Armenian massacres in 1896 won for him the titles of The Great Assassin and Abdul the Damned. In April, 1909, the Young Turks under Enver Bey rose in revolt, and the national assembly voted his deposition. Accepting his fate without a struggle, he became a state captive at Salonica, and in 1915 he was removed, first to Smyrna and then to Magnesia. Abdul Hamid was largely responsible for the influence gained by Germany in Turkey. He died in Constantinople, Feb. 10, 1918.

**Abdul Illah,** AMEER (b. 1913). Regent of Iraq 1939-53 during the minority of his nephew King Feisal II. In April, 1941, while absent from Baghdad, he was deposed by

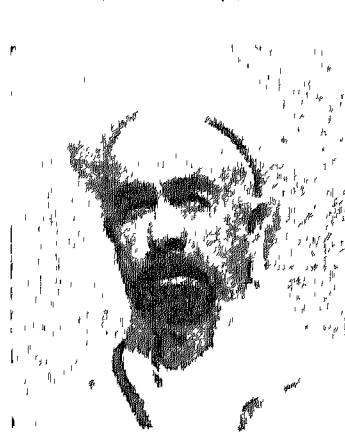


Abdul Illah,  
Regent of Iraq

Rashid Ali, a politician with pro-

Nazi sympathies, and took refuge in Transjordan. After the revolt had been put down by British intervention in Iraq, Abdul Illah was reinstated June 1, 1941.

**Abdullah Ibn Hussein** (1882-1951). King of Jordan. Born in



Ibn Hussein Abdullah  
King of Jordan

Mecca, second son of King Hussein of the Hejaz and elder brother of King Feisal I of Iraq, he was recognized in April, 1923, as ameer of the independent state of Transjordan (from 1949, Jordan). His relationship with the U.K. was established by treaty in 1928, and in 1946 the U.K. recognized Transjordan as a sovereign state, Abdullah assuming the title of king. In 1950 he united Arab Palestine with Jordan. Shot dead in Jerusalem July 20, 1951, he was succeeded by his son Talal. His memoirs were published in English, 1950.

**Abdul Mejid** (1823-61). Sultan of Turkey during the Crimean War. The eldest son of Mahmud II, he succeeded July 1, 1839, when the Turkish army and fleet surrendered to the Egyptian viceroy Mehemet Ali. However, the Great Powers intervened to protect Turkey. Abdul Mejid continued his father's reforms. In 1839 he proclaimed the rights of all subjects irrespective of creed. The status of Christians in Turkey and the general tone of the administration were greatly improved by this edict. He died June 25, 1861.

**Abd-ur-Rahman.** Name of several Arab rulers. One, a follower of Mahomet, on the death of Omar in 644, refused the caliphate to which he had been nominated. Another was leader of the Saracen hosts which were defeated by Charles Martel at Tours in 732. Three, members of the Omniad family, were caliphs of Cordova, Abd-ur-Rahman I founding this caliphate in 756, after his escape from Bagdad when the city was taken by the Abbasides. Abd-ur-Rahman II, the fourth caliph, was distinguished by his love of luxury and display, and his encouragement of architecture, music, and literature. He died in 852. Abd-ur-Rahman III was caliph from 912-61. He waged many wars against neighbouring rulers, recovered much territory lost by his predecessors, and enlarged the boundaries of his kingdom.

**Abd-ur-Rahman** (1844-1901). Ameer of Afghanistan. Grandson of the great ameer Dost Mohammed, he was driven out of Afghanistan when he first claimed the succession. In 1880, at the close of the second Afghan War, he was the candidate acknowledged by the British. He proved himself a strong and shrewd ruler, with a thorough understanding of his position as between Russia and Great Britain. He preserved the independence of his country, and his wisdom at the time of the Penjdeh incident in 1885 averted what seemed to be inevitable war between the two Great Powers. On his death, Oct. 3, 1901, he was succeeded by his son Habibullah. Consult Under the Absolute Amir, Frank A. Martin, 1907.



Abd-ur-Rahman,  
Afghan Ameer

**Abd-ur-Rahman** (1778-1859). Sultan of Morocco 1823-59. His reign is chiefly notable for the abandonment of the claim to tribute levied by the rulers of Morocco on European ships in the Mediterranean. This was to secure them from the attacks of pirates, who became troublesome again as soon as the new arrangement was concluded.

**Abecedarian Hymns.** Hymns composed in imitation of Hebrew acrostic poetry. In these each verse or part commenced with the first and succeeding letters of the alphabet in their order.

**Abecedarians** (Lat. *abecedarius*, pertaining to the alphabet). Familiar name of an Anabaptist sect founded in Germany by Nicolaus Storch in the 16th century. They held that all human knowledge prevented men from inwardly hearing God's voice, and refused to learn even the alphabet, or A B C—hence the nickname.



G. A. A. Beckett,  
English humorist

**A Beckett,** GILBERT AUBREY (1811-56). English humorous writer and dramatist. Born in London, Jan. 9, 1811, he was educated at Westminster and called to the bar. In 1831 he established Figaro in London, and was a constant contributor to Punch from the start of that journal in 1841 until his death, at Boulogne,

**Abel Test.** Mode of testing petroleum so as to ascertain the temperature at which it gives off inflammable vapour. The test is named after Sir Frederick Abel (*q.v.*); it is sometimes called the closed test.

The object of the test is to find out whether a sample of petroleum is safe under ordinary conditions of storage and use. Experiment showed that oil which gives off inflammable vapour only when



**Abeokuta.** Native chiefs about to take their seats around the Alake, President of the Council

the temperature reaches 73° F. represents the minimum of safety. This temperature is known as the flash-point, but it does not follow that oil answering the test is safe under all conditions. The test apparatus is described in the Petroleum Act, 1879. A sample of the oil is gradually heated until, on the application of a light, a blue flame or flash is seen above the surface of the liquid. The flash is due to the explosion of the mixture of oil vapour and air. There is also an Abel test for nitro-explosives.

**Abenaki** OR ABNAKI. Name of a federation of American Indian tribes who lived in the district now covered by Maine and New Brunswick. Among them were the Norridgewocks, Penobscots, and Passamaquoddies, names perpetuated in the locality. In the wars between England and France in the 18th century the Abenaki fought for the French, and in 1724 their settlement at Norridgewock was destroyed by the English and the confederacy broken up. A few of them remained in Maine and New Brunswick, where their descendants are still found; others migrated farther into Canada. See American Indians.

**Abencerrages.** Moorish family which settled in Spain in the 8th century. They attained to a position of influence, but in the 15th century, according to tradition,

the principal members were massacred by Boabdil in the Hall of the Abencerrages in the Alhambra. On this incident Chateaubriand based a novel and Cherubini an opera.

**Abeokuta.** Town of Nigeria, in the Yoruba territory. Capital of Egba district, on the Ogun river, 60 m. by rly. N. of Lagos, the town, or rather group of towns and villages, covers a large area, and is enclosed by a high mud wall.

It was founded in 1825 as a refuge from the incursions of the slave-hunters of Dahomé and Ibadan. The various tribes constituted it a free confederacy while retaining their separate religions and customs. Frequently attacked, notably in 1851 by Gezo, king of Dahomé, it resisted all attempts to cap-

ture it. Greatly improved in recent years, it has courts of justice, government buildings, and waterworks opened in 1914, and is the centre of an active trade in palm oil, rubber, timber, and other local produce and European manufactured goods. Following disturbances in 1914, the Alake, or president of the council of chiefs, placed the district of Egba under the direct control of the Nigerian government. Pop. (est.) 82,000.

**Aberaman** (Celtic *aber*, mouth). Ecclesiastical district and village of Glamorganshire, Wales. It is contiguous to Aberdare, is served by rly., and there are adjacent collieries.

**Aberavon.** Town of Glamorganshire, Wales; part of Port Talbot. On the right bank of the Avon, 11 m. E. by S. of Swansea, the town grew with the industrial development of S. Wales, and has large tinsplate and engineering works. Cwmavon, with important copper-smelting works, lies about 2 m. to the N.E. Aberavon gives its name to a county constituency which includes the borough of Port Talbot and the urban districts of Glynecrrwg and Porthcawl. Market day, Sat.

**Aberbrothock.** Old name of the Scottish town of Arbroath (*q.v.*).

**Abercarn.** Urban district and town of Monmouthshire, England. It is in the Ebbw valley 10 m. N.W. of Newport on the railway, with collieries and iron,

tinsplate, chemical works. Market day, Sat. Pop. (1951) 18,757.

**Aberconway,** CHARLES BENJAMIN BRIGHT McLAREN, 1ST BARON (1850-1934). British coal-owner and politician. Born in Edinburgh, May 12, 1850, son of Duncan McLaren, M.P. for Edinburgh, he was a nephew of John Bright. After a brilliant career at Edinburgh university, he became a successful chancery barrister. He married in 1877 the daughter of a wealthy landowner, Henry Pochin, M.P. Having turned his attention to commerce, he became interested in collieries and iron-works, shipbuilding and railway undertakings. In 1880 McLaren entered parliament as a Radical; in 1902 he was made a baronet, and in 1911 a baron. He died Jan. 23, 1934. His wife was an active advocate of women's suffrage and kindred movements, and his sons, Henry Duncan and Francis, were both M.P.s in the parliament of 1901. Francis was



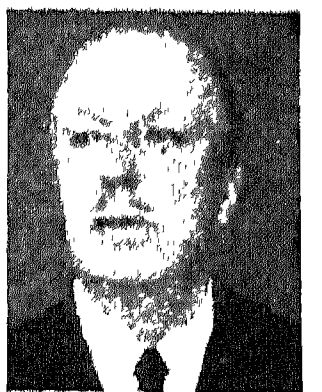
**Lord Aberconway.** British politician

accidentally killed while flying in the Royal Flying Corps, Aug. 30, 1917. Henry (1879-1953) succeeded as 2nd baron. Liberal M.P. for N. Staffs, 1906-10, for Bosworth (Leics), 1910-22, he was also chairman of John Brown, Ltd.

**Abercorn.** Settlement in Northern Rhodesia. It is about 10 m. S.E. of Lake Tanganyika on the Stevenson Road connecting that lake with Lake Nyasa. Established in 1889, it is a trading centre and h.q. of the International red locust control association. Here on Nov. 14, 1918, a German force under General von Lettow-Vorbeck surrendered to the British.

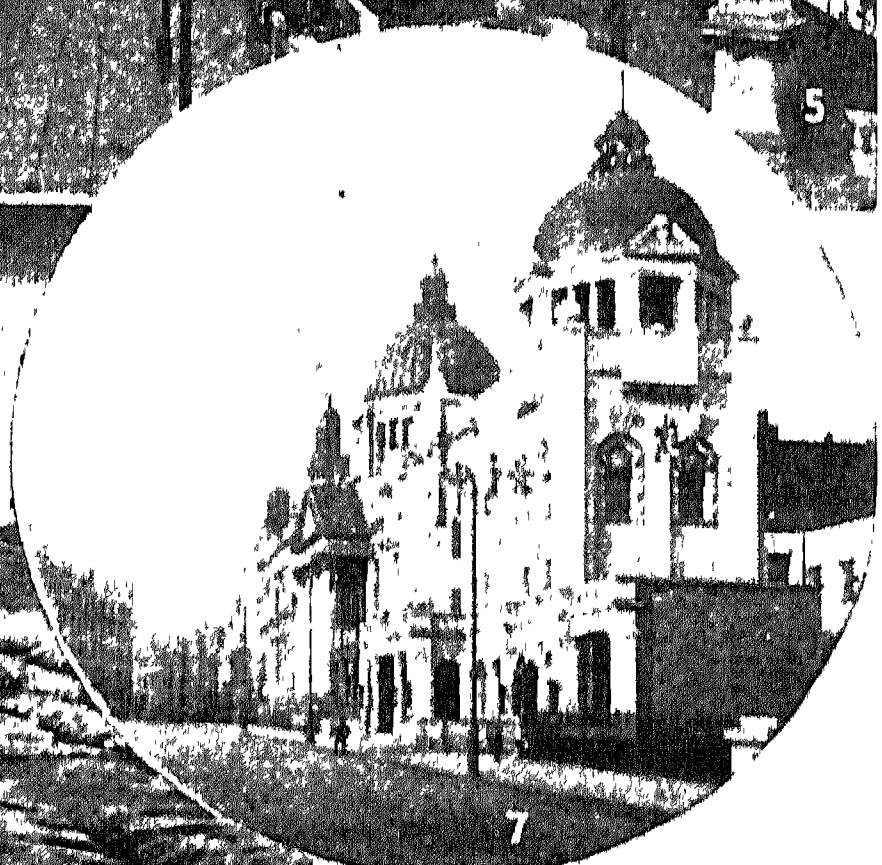
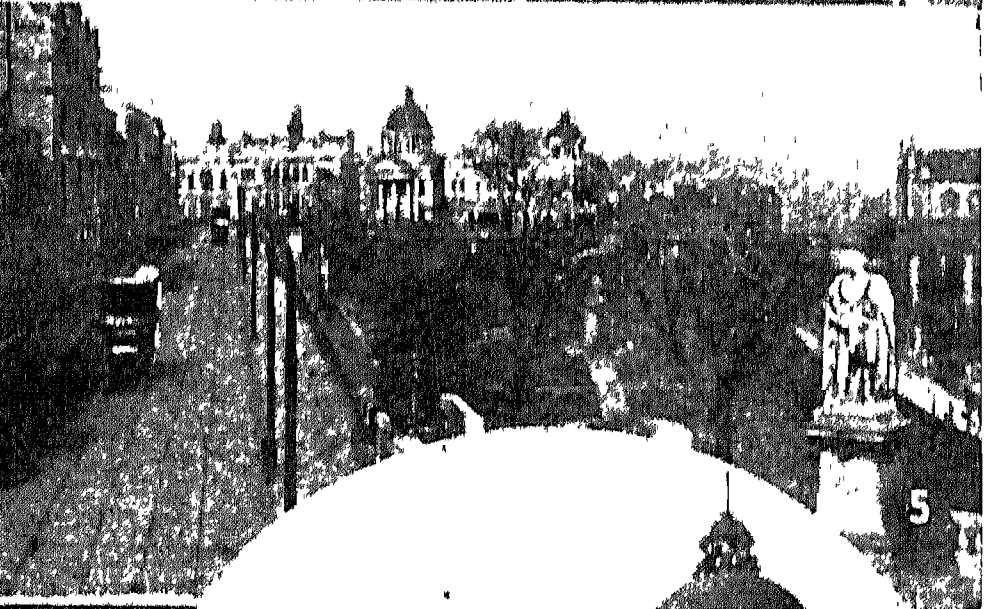
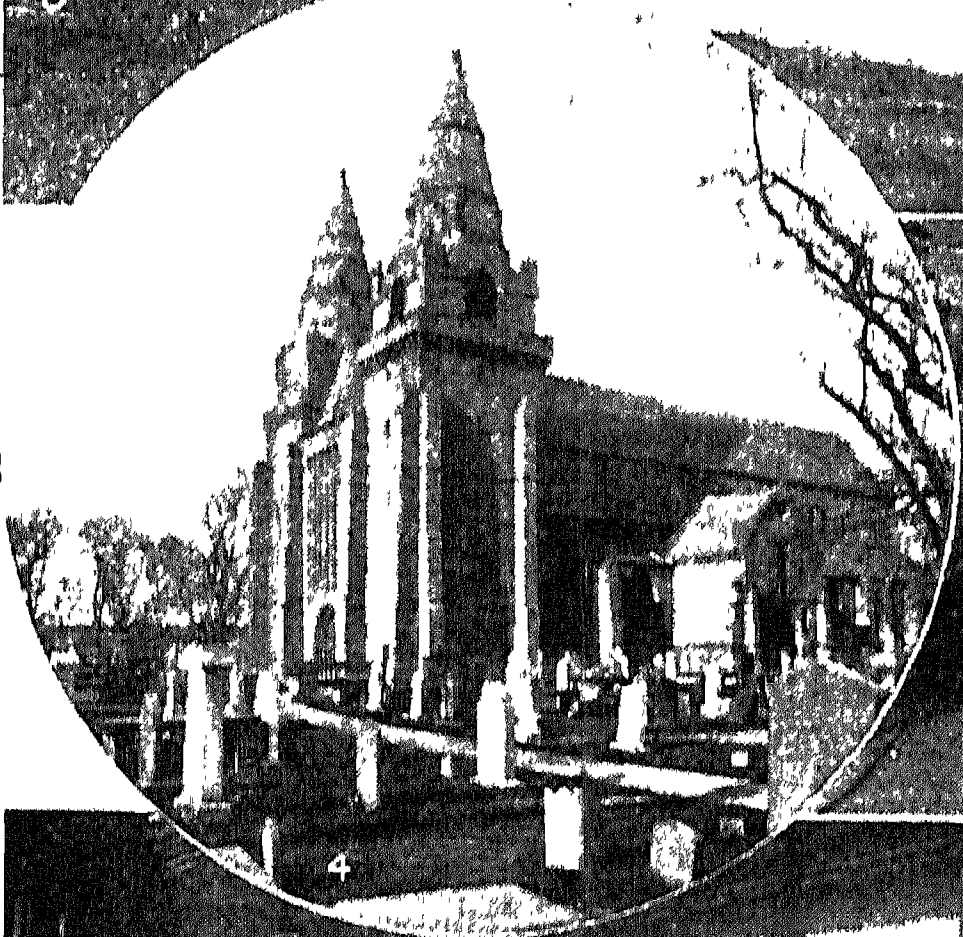
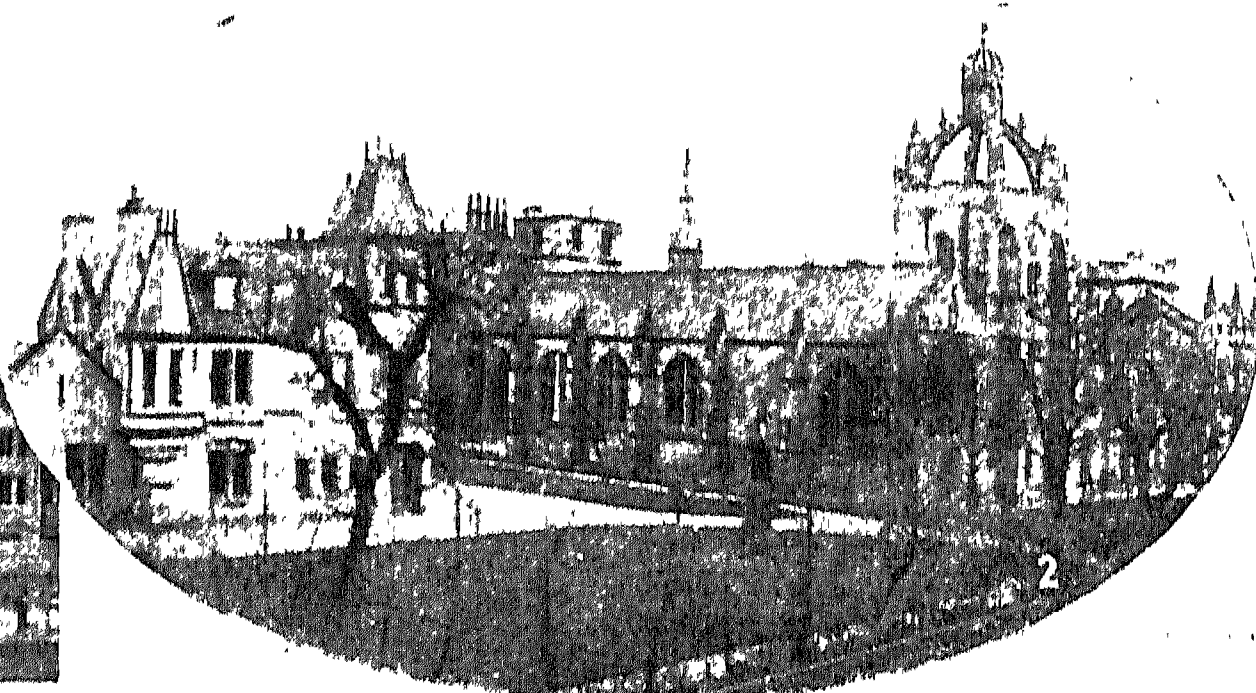
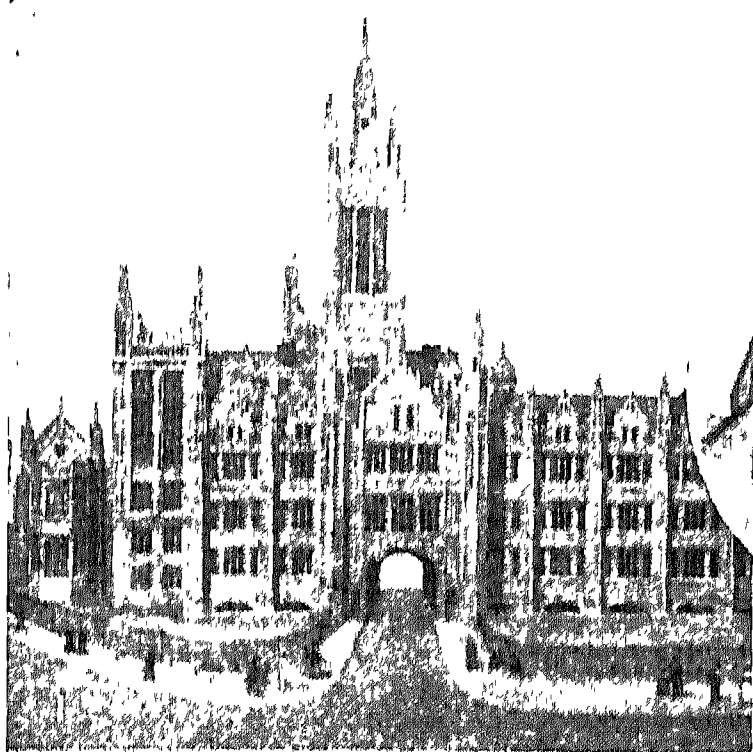
**Abercorn.** Mining district and settlement in Southern Rhodesia. It is connected by rly. with Salisbury, 90 m. S.W.

**Abercorn,** DUKE OF. Title held by the Hamilton family. It originated in 1603, when James, eldest son of Lord Claud Hamilton, was created baron of Abercorn. In 1606 the barony became an earldom, and in 1790 a marquessate. James Hamilton



**Duke of Abercorn.** succeeded 1913



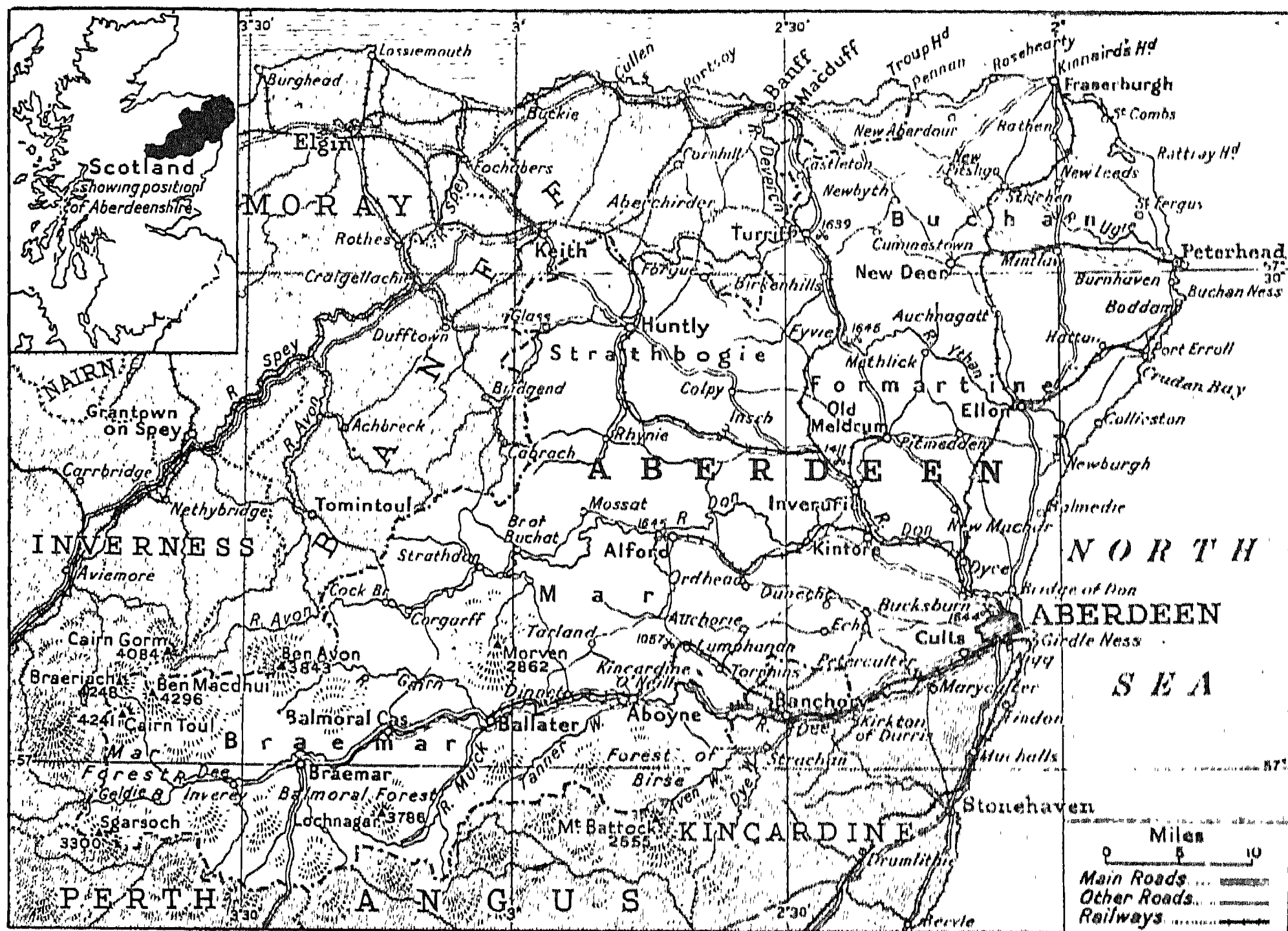


1. Marischal College, founded in 1593 by George Keith, Earl Marischal. 2. King's College, founded by Bishop Elphinstone in 1494 and united in 1860 with Marischal College to form the present Aberdeen University. 3. View

of the city from Balnagask. 4. Old Machar Church, or S. Machar's Cathedral. 5. Union Terrace Gardens, with statue of King Edward VII. 6. Fish Market. 7. His Majesty's Theatre and United Free South Church

**ABERDEEN: VIEWS OF PLACES OF INTEREST IN THE GRANITE CITY**





Aberdeenshire. With an area of nearly 2,000 square miles and a coast line of 64 miles, it is the sixth, in regard to size, of the counties of Scotland

Peel returned to office in 1841. He cultivated friendly relations with France at a time when serious trouble existed. He carried through smoothly the Oregon treaty of 1846, which ended a long dispute by extending the 49th parallel of latitude as the boundary between Canada and the U.S.A. west also of the Rocky Mts. He was also prominent in his efforts to avert the disruption of the Church of Scotland.

Aberdeen resigned with Peel in 1846, and after his leader's death was the recognized head of the party which had followed that statesman in his conversion to Free Trade. As such he became prime minister in Dec., 1852. The main event of his term of office was the opening of the Crimean War, into which the ministry was drawn somewhat against the will of its chief. Then came the rumours of suffering in the Crimea and of incompetence in the management of affairs at home. Clearly Aberdeen was not the man to organize the country for a vigorous war, and the passing of a vote of censure on the government was followed in Jan., 1855, by his resignation. He died Dec. 14, 1860, and was succeeded by his eldest son, George John James

Hamilton Gordon (1816-64). There are biographies of Aberdeen by his younger son Lord Stanmore, 1893, and by Lady Frances Balfour, 1923.

**Aberdeen,** JOHN CAMPBELL GORDON, 1ST MARQUESS OF (1847-1934). British politician. Born Aug. 3, 1847, and educated at St. Andrews and Oxford, he succeeded his brother as 7th earl in 1870. One of Gladstone's intimate friends, he was lord-lieutenant of Ireland in 1886, and in 1893-98 governor-general of Canada. In 1905 he was lord-lieutenant of Ireland, a post he retained until 1915, when on his retirement he was made marquess of Aberdeen and Temair. He had been a

the 1st Lord Tweedmouth whom he married in 1877, was prominent in political and philanthropic circles. She died April 18, 1939. In 1925 a volume of reminiscences by Lord Aberdeen and his wife was published, entitled *We Two*, followed in 1929 by *More Cracks with We Two*. Lord Haddo, eldest son of the 1st marquess, succeeded on his father's death. He was born Jan. 20, 1879. Haddo House, Aberdeenshire, is the family seat.

**Aberdeenshire.** N.E. maritime co. of Scotland. Bounded N. and E. by the North Sea, W. by Banff and Inverness, and S. by Perth, Angus, and Kincardine, it is popularly apportioned into the districts of Braemar, Mar, Strathbogie, Garioch, Formartine, and Buchan. It has an extreme length from N.E. to S.W. of 84 m., a greatest breadth of 46 m., and an area of 1,971 sq. m., and is the sixth largest of the Scottish shires.

The coast, 64 m. in extent, is bold and rocky, but almost free from indentations. The chief promontories are Buchan Ness, the most easterly extremity of Scotland, Kinnaird's Head and Ratray Head. The surface is generally hilly, and becomes extremely mountainous in the S.W., where the Grampians throw out the



Ishbel Maria,  
Lady Aberdeen

1st Marquess  
of Aberdeen

privy councillor since 1886. He died March 7, 1934. Lady Aberdeen (1857-1939), a daughter of

**Abernethy.** Police burgh of Perthshire, Scotland, on the estuary of the Tay, 9 m. S.E. of Perth. It has one of the two ancient round towers in Scotland. Pop. (1951) 675.

**Abernethy, JOHN** (1764–1831). British surgeon. Born in London, April 3, 1764, he was educated at Wolverhampton Grammar School. After serving as assistant surgeon and lecturer at St. Bartholomew's Hospital, of which he was surgeon in 1815–29, he was made professor of anatomy and physiology at the College of Surgeons in 1814. Abernethy, who first enunciated the principle that local diseases are symptomatic, believed that most of them arise from disordered digestive organs. Popular and eccentric in manner, he was an excellent medical teacher. He died at Enfield, April 28, 1831.



John Abernethy,  
British surgeon  
*Sir T. Lawrence, P.R.A.*

**Aberration.** In optics, any way in which the image formed by an optical system fails to realize theoretical perfection as a sharply-defined scale model of the object. In practice the most troublesome is chromatic aberration, which produces coloured fringes round the boundaries of the image. The others, in decreasing order of importance, are spherical aberration, coma, astigmatism, field curvature, and distortion.

Chromatic aberration arises in lens systems because the shorter wavelengths of light are refracted less than the longer wavelengths. Thus the image of a point produced by a simple lens is not another point but a short linear spectrum spread out along the direction of the lens axis. The defect can be reduced by using combinations of lenses made from different kinds of glass which have different dispersions. An achromatic doublet may consist of one lens of crown glass and another of flint glass so chosen that the focal length of the combination is the same for two distinct wavelengths. In compound lenses each component must separately be made achromatic. It was because mirrors are not subject to chromatic aberration that Newton turned to them in preference to lenses for astronomical telescopes.

Spherical aberration arises when a lens with spherical surfaces or a spherical mirror is focusing light from a point on its axis, because all

the rays are not brought accurately to a focus in a single image point, as is assumed in simple or Gaussian optics. Instead the rays become tangential to a surface of revolution formed by a so-called caustic curve so that rays lying farther from the axis are brought to a shorter focus. Thus with a six-inch mirror of 30 ins. focal length, the image of a point at the position of best focus is a circle with a diameter of 1/100 in. For any given object distance, spherical aberration can be corrected by changing ("figuring") the surface of mirror or lens to a parabola. The difference in figure is very slight; it can be produced by a skilled workman in hand polishing, but is not practicable in mass production.

Of the other aberrations, coma gives for the image of a point not on the axis a shape like a comet's tail with the head pointing towards the axis. Astigmatism results in the formation of two line images, perpendicular to each other, at different distances from the lens. With field curvature the image of a plane surface perpendicular to the axis forms a curved instead of plane surface. When corrected the new plane image may be distorted in one or other of two ways called barrel and pincushion distortion.

All these forms of aberration can be mitigated by figuring, but they cannot be entirely removed for all positions of object and image: compromise is always necessary. Moreover, it is impracticable to determine the best form of a complicated optical system purely by theory: calculation has to be supplemented by ray tracing. The problem increases in difficulty with the nearness of the object to the lens—and is most troublesome in the manufacture of microscopes.

**Aberration of Light.** Astronomical phenomenon first observed by James Bradley (1693–1762), and correctly interpreted by him in 1728 when he was trying to measure parallax. Bradley's measurements provided the first direct verification of the Copernican theory of planetary motion.

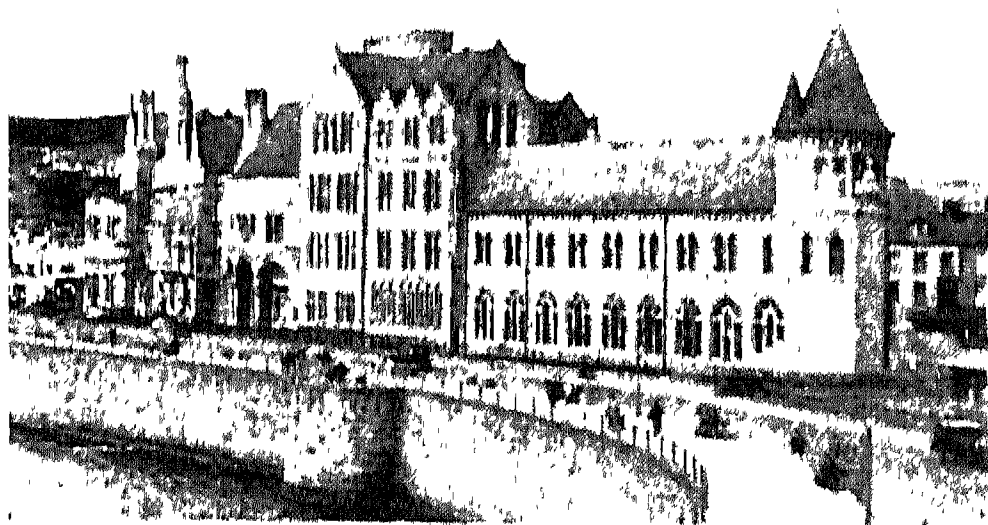
The phenomenon may be understood from the analogy of falling raindrops: if they are falling vertically they appear to a moving observer to originate from a direc-

tion in front of him. If he moves at constant speed around a circular path the point of origin of the raindrops appears to him also to move in a circle traversed in the same sense. The size of the apparent circle is proportional to the observer's speed. The aberrational motion of a star is in general elliptical. The extremes are a straight line when the star lies in the plane of the earth's orbit and a circle when it lies (almost) along the normal to the orbit. The angle subtended by the semi-major axis of the ellipse is called the constant of aberration, and its value is about 20.5 seconds of arc.

**Abertillery.** Urb. dist. of Monmouthshire, England, 16 m. N.W. of Newport. It grew with the development of the adjacent coal mines and has iron and tinplate works. Under the 1948 redistribution it gave its name to a county constituency. Market day, Sat. Pop. (1951) 27,617.

**Aberystwyth.** Bor., market town, seaport, and holiday resort of Cardiganshire, Wales. It stands at the junction of the rivers Ystwyth and Rheidol, on Cardigan Bay. It has a pier originally built in 1864, and a promenade extending from Constitution Hill in the N., round Castle Point, to the harbour.

Here are University College, attached to the university of Wales,



Aberystwyth. Façade of University College

with a frontage of over 400 ft., opened in 1872; the National Library of Wales founded 1907; and the offices of various Welsh govt. depts. The ruined 12th-century castle, dismantled in 1647, is said to have been built by Gilbert Strongbow, and was used by Charles I as a mint. The town depends on trade in agricultural products of the vicinity and on holiday visitors, who are attracted by its fine beach, boating and fishing facilities, and beautiful surroundings. Governed under a charter granted by Henry IV, it was one of the Cardigan par. boroughs till 1885. Market day, Mon. Pop. (1951) 9,323.



chief baron of the Exchequer. Scarlett was M.P., first as a Whig and then as a Tory, 1810-35, and at one time attorney-general. In 1835 he was made a peer, the title being still held by his descendants. Abinger's second son was Sir J. Y. Scarlett (1799-1871), the cavalry leader at Balaclava. See Memoir, P. C. Scarlett, 1877.

**Abinger.** Village of Surrey, 8 m. S.S.E. of Guildford. It has a church with a Norman nave (damaged by enemy action, 1944, restored 1953), a British burial mound, and stocks on the green. Abinger Hammer, with a clock portraying a smith striking the hours, is the site of a vanished iron industry. The magnetic station of the Royal Observatory was at Abinger during 1924-58. In the neighbourhood are Crossways Farm, claimed to be the place described in Meredith's *Diana of the Crossways*, and the picturesque hamlet of Friday Street, a popular rendezvous for walkers.

**Abington, FRANCES** (1731-1815). English actress. Daughter of a private in the Guards, her maiden name was Frances Barton. She was first a flower-seller, then a street singer and reciter at taverns and later servant to a French milliner in Cockspur Street, London. She made her stage debut at the Haymarket as Miranda in Mrs. Centlivre's comedy, *The Busybody*, Aug. 21, 1755, and in 1759 married her music master, Mr. Abington. After five years in Dublin, she was invited by



**Mrs. Abington, English actress**  
Painting by Sir Joshua Reynolds, P.R.A.

David Garrick to Drury Lane, where she remained for 18 years, playing the great ladies of comedy, Shakespearean heroines, romps, and even chambermaids, and creating the part of Lady Teazle in the original production of *The School for Scandal* in 1777. In 1782 she went to Covent Garden, and during 1790-7 was absent from the

stage, on which she made her last appearance, as Lady Racket in *Three Weeks after Marriage*, April 12, 1799. She died March 4, 1815.

**Abiogenesis** (Gr. *a*, not; *bios*, life; *genesis* origin). One theory of the origin of life. The term,



**Abinger Hammer.** The name of this picturesque Surrey village is a reminder of the iron industry which once flourished here

first used by Huxley in 1870, is opposed to biogenesis. According to it, living matter may take its origin from non-living matter; in other words, there is such a thing as the spontaneous generation of life. See Biology; Life.

**Abipones.** South American Indian tribe formerly inhabiting N. Argentina. They are known mainly from the sojourn among them of an 18th-century Jesuit, Dobrizhoffer. They practised tattooing, lip-piercing, ear-piercing, and boy infanticide. Allied in speech to the Guaycurus, they have been absorbed or extinguished by the Toba tribe (*q.v.*).

**Abishai.** Son of Zeruah and nephew of King David. A man of remarkable courage, he went with David into the camp of Saul (1 Sam. 26), whom he wished to kill, and fought against Edom in the Valley of Salt (1 Chron. 18). One of the three who risked their lives by entering the Philistine lines to get water for David from the well at Beth-lehem (2 Sam. 23), he also saved the king's life by killing the Philistine giant, Ishbi-benob (2 Sam. 21).

**Abitibi.** Region of N. Ontario, Canada, through which flows the 200-m. river of the same name, a tributary of the Moose. The Ontario govt. rly. runs parallel to the river for 150 m. There are several hydro-electric power plants within the region, supplying

power to many industrial mining concerns. The pulp and paper industry has been greatly developed from the natural resources of the region. Its centre is at Iroquois Falls. Abitibi also includes two lakes, one 60 m. long,

and a govt. game reserve. Abitibi county, in the province of Quebec, has been an agricultural settlement area since 1912.

**Abjuration** (Lat. *ab*, from; *jurare*, to swear). In general, renunciation of any kind, more particularly renunciation of an oath of allegiance to a sovereign or creed. In England the word was used of criminals and others who swore to leave the country. The oath of abjuration was an oath imposed by an Act of 1701 on all M.P.s and officials; by it they abjured all allegiance to the Jacobite cause, and promised to maintain the succession to the throne as fixed by the Bill of Rights and the Act of Settlement.

**Abkhazia.** Autonomous soviet socialist republic within Georgia S.S.R., Russia, home of the Abkhaz, a people of Caucasian origin. In N.W. Georgia, it lies between the Black Sea and the S.W. slopes of the Greater Caucasus. Grain and high-quality tobacco are the staple crops; the lowlands also produce citrus fruits, tea, and other sub-tropical plants; the mountain slopes are forested. Lumbering and paper-making, wine-making, tobacco-processing, and fruit-canning are among the industries. Mountain streams are harnessed to provide hydro-electric power. The Black Sea coast has health and holiday resorts. Sukhumi, the capital, is

Commonwealth; e.g. in Canada there is a department of Indian affairs; in the Union of South Africa and in Australia a department of native affairs; Papua has a commissioner for native affairs; New Zealand a minister representing the Maori.

**Bibliography.** The Races of Man, A. C. Haddon, 1929; Relations of the Advanced and Backward Races of Mankind, J. Bryce, 1902; Native Races and Their Rulers, C. L. Temple, 1918; The Savages of America, R. H. Pearce, 1953.

**Abors.** Primitive Mongoloid tribes inhabiting the Abor hills in the Assam borderlands. They were subdued by a British punitive expedition, 1911-12.

**Abortion** (Lat. *ab*, from; *oriri*, to be born, to arise). Expulsion of the contents of the uterus or womb before the offspring is possibly capable of surviving. In human-beings, this is before the 28th week and abortion has therefore the same meaning as miscarriage. In law, however, abortion means the artificial expulsion of the uterine contents at any period of pregnancy.

Abortion in the medical sense is very common, having been estimated at as much as one in every six pregnancies. It is more common in first pregnancies, and some women abort usually at about the same period with each pregnancy (habitual abortion). Some of the many causes of abortion are malformation of the foetus, disease or displacement of the uterus, maternal ill health, and hormone imbalance. Accidents and emotional shock rarely produce abortion unless the patient is prone to it. The cause is not always known, but it is believed that unconscious emotional factors play a large part.

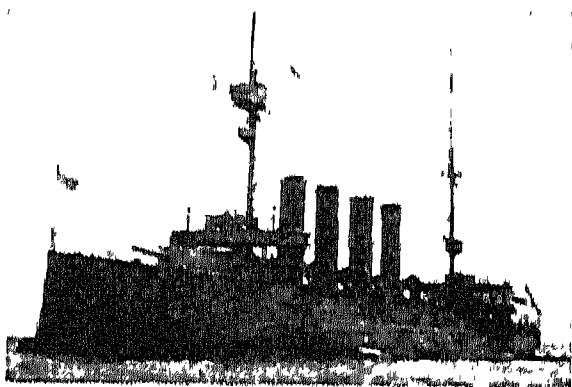
Abortion can be deliberately induced by certain poisons (ergot, quinine), and by instrumental interference with the uterine contents. Any attempt to cause abortion is illegal. In law the essence of the offence is the intention to procure abortion, and it is an offence to supply any instrument or drug for the purpose even although the woman does not use it and is not even pregnant. It is lawful for abortion to be induced for medical reasons (therapeutic): that is, when the continuation of pregnancy is a hazard to the life or health of the mother.

The symptoms of abortion are uterine bleeding followed by intermittent pains like labour pains and by the eventual expulsion of the products of conception. Bleeding

by itself may indicate only a threatened abortion, and after bleeding ceases the pregnancy often continues normally. The risks are infection and excessive haemorrhage. Occasionally the abortion is incomplete in that the ovum is expelled but the membranes are retained. This may necessitate evacuation of the uterus by operation.

**IN DOMESTIC ANIMALS.** The most common specific disease causing abortion in dairy cattle is a form of brucellosis, caused by *Brucella abortus* (Bang's bacillus), and termed contagious (or epizootic) bovine abortion (or Bang's disease).

Infection is commonly introduced into a herd by an infected cow, which may calve at or near full term. The germs are liberated



H.M.S. Aboukir, sunk by German submarine U9, September 22, 1914

from the afterbirth and discharges after an abortion or after the calving of an infected animal, and contaminate pastures, food and water supplies. Infection is normally by mouth. A calf from an infected cow, if it lives, will pass out the bacilli in its droppings, whilst an infected cow may harbour the germs in its udder and so infect the milk for a long period. Infection can also be transmitted by a bull used for service shortly after it has serviced an infected cow. An infected cow or heifer usually aborts at the sixth or seventh month of pregnancy. Abortions in an infected herd tend to diminish after a year or so in the old stock—owing to an acquired tolerance—but the incidence in heifers, and cows introduced into the infected herd, remains high.

In Great Britain, vaccination with strain 19 vaccine (S. 19) has been successfully used to combat bovine abortion. The law requires that notice be given of a recent abortion at the time of sale or service of a cow and prohibits the exposure of a recently aborted cow on common grazings or in a market. A valuable aid in ridding herds of abortive infection is Artificial Insemination (*q.v.*).

Contagious abortion in mares is generally caused by *Salmonella*

*abortus equi*. Mares carrying twin foals frequently abort at the 5th-7th month of gestation.

Infectious abortion in pigs caused by *Brucella abortus suis* is frequent in the U.S.A. and on the Continent of Europe. The most important cause of infectious abortion amongst sheep in England and Wales is *Vibrio foetus* which is widespread and, in some localities, enzootic. It usually occurs during the earlier periods of pregnancy.

*Brucella melitensis* (see Undulant Fever), a common cause of abortion in goats in S. Europe, is unknown in Great Britain. The goat is also susceptible to *Brucella abortus* infection but, although this organism is widespread in British dairy herds, it does not appear to be a factor of any importance among British goats. Abortions in bitches may occur as a result of infection with haemolytic streptococci and this may be transmitted by the stud dog.

**Aboukir.** Ship name in the Royal Navy, first given to the French 74-gun ship Aquilon, taken at the battle of the Nile in 1798. The name was revived for a 74-gun ship launched in 1807 and for a 90-gun ship launched in 1848. The fourth Aboukir was an armoured cruiser of 12,000 tons completed in 1902. On Sept. 22, 1914, under the command of Capt. J. E. Drummond, and in company with the Hogue and the Cressy, she was torpedoed by the German submarine U9, and sunk, with a loss of 25 officers and 502 men.

**Aboukir Bay.** See ABUKIR.

**About,** EDMOND FRANÇOIS VALENTIN (1828-85). French



Edmond About, French writer

writer. Born at Dieuze, Moselle, Feb. 14, 1828, About was educated in Paris, and in 1851 attended the French School at Athens. His stay there inspired *La Grèce Contemporaine* (contemporary Greece), 1854, and during the same year his *Tolla Peraldi*—a tale of modern Rome—increased his fame. His other novels included *Germaine*, 1857; *Trentet Quarante*, 1858; *Madelon*, 1863; *Le Roman d'un Brave Homme* (romance of an honest man), 1880. About's attack on the temporal power of the Pope and his anticlericalism made him enemies, but he never shrank from controversy, and his book on Alsace, 1872, involved him in trouble



is to Jew and Moslem alike the supreme type of faithfulness, courage, generosity, and wisdom.

**Abraham, WILLIAM** (1842-1922). British labour leader. After some education at Carnarvon, he entered the coal mines, his father being a miner. Elected in 1886 M.P. for the Rhondda division of Glamorganshire, he retained his seat at several elections. In 1911 he was made a privy councillor. His gifts as a singer won for him the title Mabon. He died May 14, 1922.

**Abrahamites.** Sect of Syrian heretics. It was founded in the 9th century by Abraham of Antioch, who denied the divinity of Christ. The name was also given in the 18th century to certain deists in Bohemia, who falsely claimed to represent the teachings of John Hus.

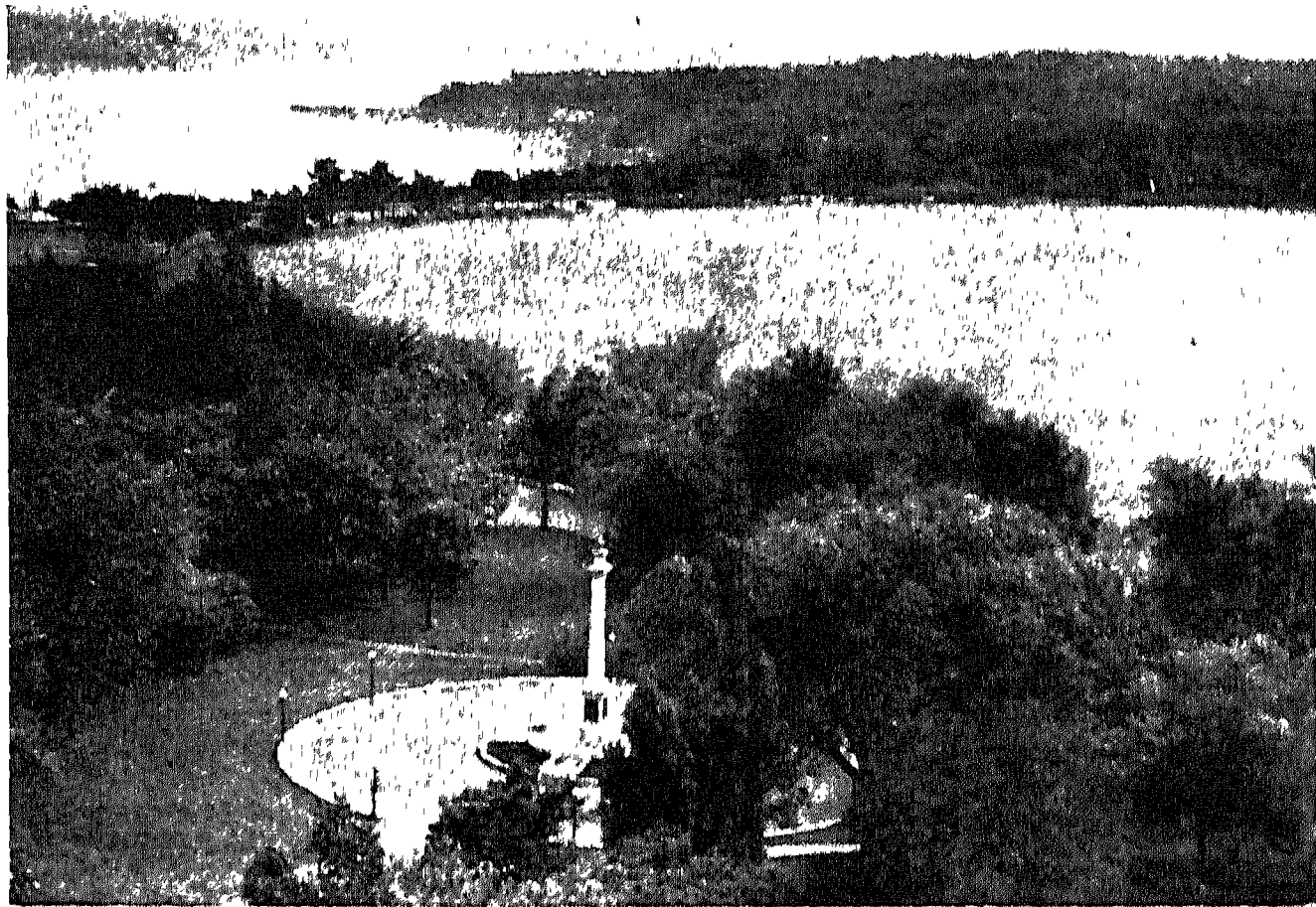
**Abraham Lincoln.** Play by John Drinkwater (*q.v.*) based on the life of the great U.S. president. First produced Oct. 12, 1918, at the Birmingham repertory theatre under the author's direction, it was staged at the Lyric, Hammersmith, the following Feb., and ran there for 466 performances. William J. Rea played the name-part in each production. See Lyric Theatre, Hammersmith; Playfair, Sir Nigel.

**Abraham Men.** Slang term used in England in the 16th-18th centuries for a class of able-bodied beggars. One of the wards in Bethlem Hospital, London, was for lunatic beggars, and was named after Abraham, probably because of the reference in St. Luke's Gospel to the beggar carried into Abraham's bosom. These lunatics wore a special badge and were allowed to go about begging. 'Tom o' Bedlam or Abraham Man was the name given to a beggar of this type, and the country became infested with their imitators, known as sham Abrahams or Abram coves.

**Abrahams, HAROLD MAURICE** (b. 1899). British athlete. Born Dec. 15, 1899, and educated at Repton and Cambridge, he represented Great Britain in the Olympic games in 1920 and 1924, winning the 100 metres in 1924. He captained the British athletic team in the Olympic games of 1928. Called to the bar in 1924, he became secretary of the national parks commission in 1950. A popular broadcaster and writer on athletic subjects, he wrote, in collaboration with his brother, Sir Adolphe Abrahams (b. 1883), hon. medical officer to the British Olympic athletic team, two books on training athletes.

**Abraham's Bosom.** Figurative expression used by Jews and Christians to signify the abode of the faithful departed. It was so used by Christ in the parable of the rich man and Lazarus (Luke 16). The term is derived from the ancient practice of reclining on couches at meals, so that the head of each guest was leaning towards the bosom of his neighbour. Thus the chief guest was said to recline in the bosom of the host—the place of honour; e.g. in John 13 it is recorded that there was leaning on Jesus' bosom one of the disciples, whom Jesus loved.

**Abrantes.** Fortified town of Portugal, also a rly. junction, in Ribatejo province. On the Tagus, 32 m. N.E. of Santarem, it is noted for cork, woodworking, and pottery. Founded by the Iberians and colonised by the Romans, it



Plains of Abraham, near Quebec, Canada, showing the monument to Wolfe and Montcalm on the scene of Wolfe's great victory in 1759

has been the site of many battles. Its castle is mentioned by the poet Camoens. Pop. (1950) 48,925. An industrial suburb, Rossio de Abrantes, lies across the Tagus.

**Abrasives.** Scouring and polishing materials used in a variety of manufacturing processes. High-grade abrasives are natural minerals, such as emery or corundum, or artificial products of alumina or silicon-carbide, such as carborundum; these materials are largely limited in use to the metal-working industries. Corundum is obtained from Palmer Rapids, Ontario, Corundum Hill, North Carolina, the Leydsdorp district in the Transvaal, and Madagascar. Emery is obtained from Turkey, Naxos, and Peekskill, New York State.

Artificial abrasives are, in general, made by electrical power obtained

from waterfalls, in France, Switzerland, Canada, and the United States. Low-grade abrasives are crushed quartz for sandpaper, etc.; quartz sand for plate-glass making and for etching glass and stone; feldspar and quartz for polishing powders, etc.; pumice powder, diatomaceous earth or tripoli for scouring materials; flint pebbles for use in grinding pigments, etc.; and, finally, grindstones, such as those made from the millstone grit of the Pennines, whetstones, hones, etc. See Carborundum; Grinding.

**Abraxas.** A mystic word engraved on gems anciently worn, sometimes in rings, as amulets. Analogous to abracadabra, the word abraxas dates apparently from the time of the Gnostic Basilides, and the Greek letters composing it, used as numerical characters, represent the number 365, held by the Gnostics to sym-

bolise the spiritual manifestations of the Supreme Deity, the number of worlds forming the universe, or the number of days in the solar year. Abraxas amulets, which often bear capricious symbols or figures, were largely imitated in medieval times. The word is said to be derived from the Coptic for Holy Name or the Hebrew Ha-Brachah, blessing. See Gnostics; consult also The Gnostics and their Remains, C. W. King, 1887.

**Abraxas.** A species of moth, best known as the magpie moth (*Abraxas grossulariata*), which destroys the leaves of bush fruit-trees. The grubs are pale in colour, with black spots, and arrive at the usual caterpillar stage in early summer. They are best dealt with when the fruit is in the early stages of formation, and

Absalom and Lord Shaftesbury as Achitophel, the satirist drew remarkable parallels between the times of Charles II and those of David and Absalom, all his contemporary characters and parties being thinly disguised under Biblical names. A Second Part of the satire, 1682, was mainly written by Nahum Tate, Dryden's contribution to it being only about 200 lines.

**Abscess** (Lat. *ab*, from; *cedere*, to go away). Collection of pus or matter bounded by tissue called the abscess wall. An acute or inflammatory abscess is due to septic infection by bacteria, and is usually treated by hot fomentations in the earlier stages and incision in the later. A chronic or cold abscess is nearly always a manifestation of tuberculosis (*q.v.*), and may indicate deep-seated disease. Abscesses respond well to treatment by antibiotics.

**Abscissa**. In plotting a graph on squared paper, points on the curve of the graph measured from the horizontal basis or axis are abscissae, those measured from the vertical axis being ordinates. See Co-ordinates; Graph.

**Absentee** (Lat. *absens*, being away). In general, one who is absent, but the word has come to be specially associated with Irish landlords. Many of these, while continuing to draw their rents from Ireland, lived elsewhere, and the Irish regarded it as a grievance that the money paid by them in rent should be spent in other lands. The problem was an old one, and in Tudor times measures were taken against absentees. For some years in the 18th century the holders of offices in Ireland had their incomes heavily taxed unless they resided in the country. The question was again acute in the 19th century, after the union of the Parliaments had provided an additional reason for absenteeism from Ireland, but it was largely resolved by the gradual transfer of the land from the landlords to the tenants.

Before the Revolution there was a good deal of absenteeism among French landlords. The U.S.A., Canada, Australia, and other new countries have many absentee landlords, owning large tracts of land but living elsewhere.

**Absinthe** (Greek *apsinthion*, wormwood). High percentage (50 to 85) alcoholic liquor prepared from flower and leaves of *Artemisia absinthium* or wormwood. To the oil of wormwood angelica, star anise, hyssop, balm, mint, cinna-

mon and other aromatics are added, the artemisia being digested first with spirit and the aromatics for a few days. The resulting infusion is steam-heated with artemisia, balm, and hyssop leaves to extract the chlorophyll which gives a characteristic green colour. The bitter principle in genuine absinthe has toxic characteristics, and manufacture and sale have therefore been controlled in several European countries.

**Absolute** (Lat. *absolutus*, free). Philosophical term. That which exists in and by itself, independently of all other conditions or relations, and cannot be other than it is. Its opposite is relative.

**Absolute Units**. Fundamental units, such as the centimetre (length), gram (weight), and second (time), which form the basis of the C.G.S. system of scientific units and from which other units are derived. Absolute temperature is calculated from the absolute zero which, by the laws of thermodynamics, is the lowest temperature that can exist. It is  $-273.1^{\circ}$  centigrade. See Units.

**Absolution** (Lat. *ab*, from; *solutus*, free). Theological term for the forgiveness of sins, after public or private confession, pronounced by priest to penitent in the name of God. Absolution was recognized by the Jews (2 Sam. 12). The forms used in Christendom vary with the doctrine, but are based on interpretations of Matt. 16 and 18, John 20, Acts 2, 2 Cor. 2 and 5, and James 5. Anglican usage is as prescribed in the Book of Common Prayer. In the Roman Catholic Church there is an office of absolution for the dead. Contrition and, where wrong has been done, restitution are essential to absolution. In law the word implies acquittal. See Confession, Auricular.

**Absolutism**. Condition or principle of rule by a single individual uncontrolled by any other constitutional authority. In practice, the power of an absolute ruler is limited by what his people will endure without revolting. The Tyrants of ancient Greece, such as Polycrates of Samos and Periander of Corinth, and in modern times the Tsar of Russia before the revolution of 1917, are examples of absolute rulers. See Government; Sovereignty.

**Absorbent Materials**. Materials which have the property of absorbing liquids, gases, heat, light, or sound. In building, bricks, stone, cement and concrete need damp-proofing treatment to

prevent their absorption of water. Bricks vary in their absorbent qualities from 3 per cent of their volume for the hardest blue bricks to 22 per cent for ordinary stock bricks, the average brick absorbing water to about 15 per cent of its volume. Stone varies from  $\frac{1}{2}$  per cent for granite to 10 per cent for sandstone and 13 for Portland stone. Absorption in concrete depends upon the proportions and quality of the cement and sand used.

Chemicals used to absorb moisture from the air include sodium chloride and zinc chloride (driers).

For surgical and other purposes cotton is made absorbent by removing from the fibre its natural wax. Waste or unspinnable cotton is boiled with caustic soda leaving a virtually pure cellulose. This is employed for surgical dressings, for making gun-cotton, and in the manufacture of artificial silk.

Gases are absorbed by carbon, especially wood charcoal, in varying proportions. One volume of amorphous (non-crystalline) carbon can absorb as many as 85 vols. of hydrochloric acid or 90 vols. of ammonia, the amount increasing considerably with the temperature. Because of this property, charcoal is used in gas masks as a dyspepsia remedy, and in industrial processes. See Adsorption.

Certain materials such as asphalt and bitumen have special capacities for the absorption of heat and have therefore to be insulated against it. Thermal insulation in general is achieved by the presence of inert air cells in fibrous or sponge-like material.

Materials used in the absorption of sound are noted under Acoustics.

**Absorption** (Lat. *absorbere*, to suck in). Sucking up of a liquid solution throughout the mass of the solid absorbing material.

**Absorption of Light**. This is the retention of some part of the light from any luminous source, by the medium air, water, or a transparent or semi-transparent solid through which the light travels. If a luminous body be in a perfect void the energy of its light loses nothing as it travels outwards. But between the stars there is light absorbing matter; it contains an uncertain quantity of cosmic dust and, it is supposed, some unilluminated matter agglomerated in dark nebulae.

The atmospheres of planets may also be highly absorbent, *e.g.* in the cloudy atmosphere of the planet Venus. But as on the one hand no medium is entirely transparent to light, and always absorbs some



**Abu Hassan.** Hero of the story, *The Sleeper Awakened*, in *The Arabian Nights*. He is a citizen of Bagdad who, entertaining the Caliph unawares, becomes his friend and favourite. A similar story is told of the drunken tinker in the Induction to Shakespeare's *Taming of the Shrew*.

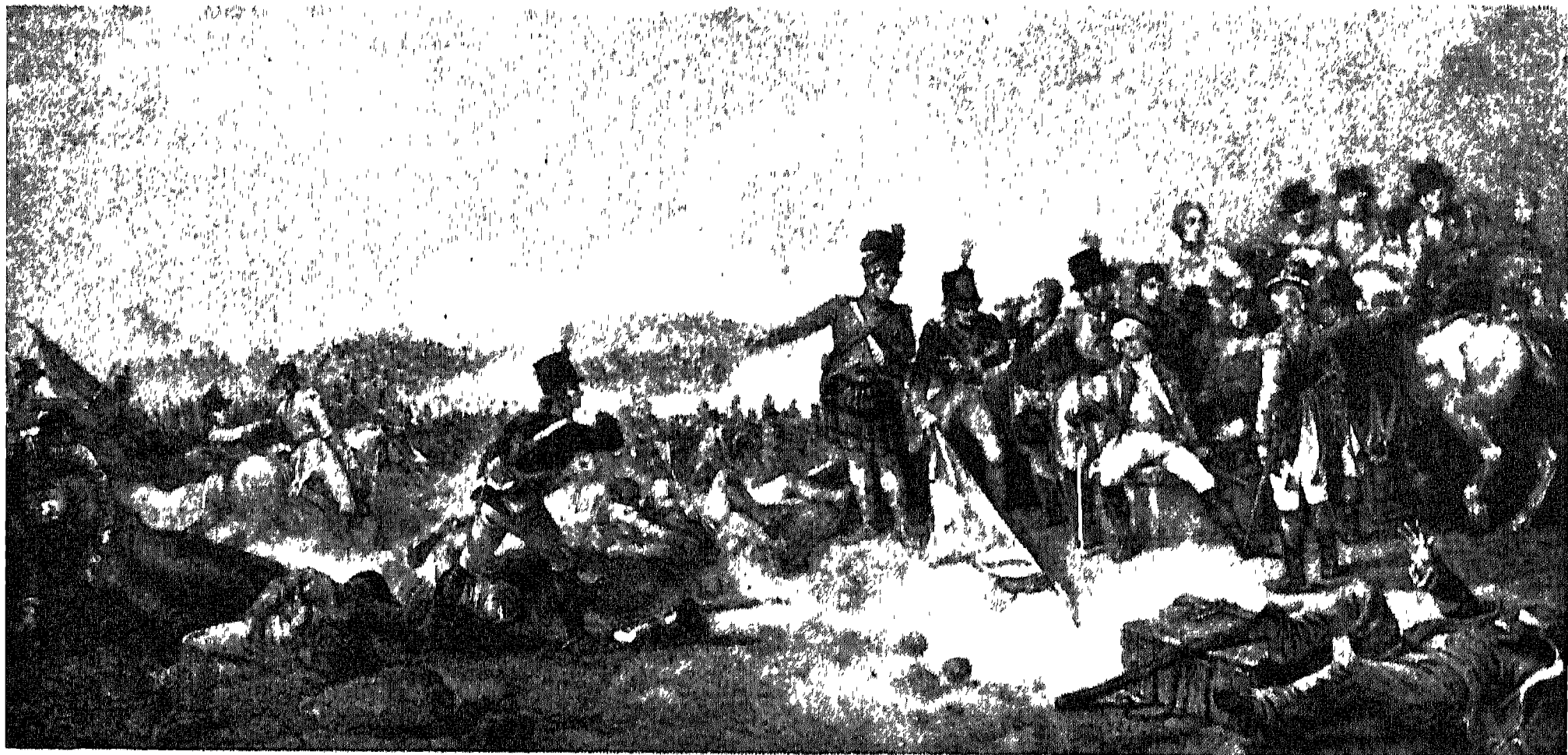
**Abukir, ABOUKIR, OR ABU-QIR.** Village in Egypt, on Abukir Bay, 14 m. N.E. of Alexandria. Near here Nelson at the battle of the Nile defeated the French fleet,

al-Hakam II, he wrote his medical *vado mecum*, a sort of encyclopedia in 30 sections, the last and most important of which dealt with surgery, hitherto neglected by Muslim authorities. This surgical part, translated into Latin, was long the standard text-book of European surgery, and is one of the foundations of modern surgery.

**Abulfaraj** (1226-86). Syrian bishop and writer in Arabic and Syriac, surnamed Bar-Hebraeus. Born at Malatia, Armenia, of

Abridgment of the History of the Human Race from the Creation to 1329, and a geography.

**Abul Ghazi** (1603-64). Khan of Khiva, said to be a descendant of Jenghiz Khan. He is the author of a genealogical history of the Mongols and Tartars from Adam to his own times. A version from the dictation of a Bokharan merchant was rendered into German and introduced into Europe by some Swedish officers, who had been interned in Siberia.



**Abukir.** On March 21, 1801, in the battle of Alexandria, fought near Abukir, Sir Ralph Abercromby (q.v.), commanding the Mediterranean expedition, defeated the French under Baron de Menou, but was himself mortally wounded, dying a week later.  
*Painting by Philippe Jacques de Loutherbourg, R.A.*

Aug. 1, 1798, Napoleon overcame the Turkish army, July 25, 1799, and Abercromby defeated the French, March 21, 1801. In the neighbourhood are extensive Egyptian and Roman remains, including the ruins of Canopus. The old Canopic mouth of the Nile emptied itself into the bay. See Nile, Battle of the.

**Abu Klea.** Name of some wells in the Sudan, on the route from Korti to Metemneh, where the British repulsed the dervishes in 1885. The expedition led by Lord Wolseley was proceeding along the Nile to the relief of Gordon. To save time by avoiding the loop made by the Nile above Dongola, a camel corps under Sir Herbert Stewart was sent across the desert. On Jan. 17 this was attacked at Abu Klea, and on the 19th at Abu Kru, where Stewart was mortally wounded. The little force reached the Nile near Khartum, but was too late to save Gordon.

**Abulcasis** (d. c. 1013). Arabian physician. Practising at the city of Cordova in Spain, where he was court physician to the Caliph

Jewish descent, he was distinguished by his knowledge of languages, philosophy, theology, and medicine. Made bishop of Gubas at the age of twenty, he took the name of Gregorius. His best-known writings are a *Chronicle of Universal History* and a commentary on the Syriac version of the Bible.

**Abul Fazl** (1551-1602). Indian historian. A vizier of the Mogul emperor Akbar, he won fame with his *Akbar Nameh* (*Book of Akbar*), consisting of a history of Akbar's reign and an account of the political, civil, and religious institutions of the India of his time. It has been translated from the Persian into English. Abul Fazl was assassinated at the instigation of Akbar's son Selim, afterwards the emperor Jehangir.

**Abulfeda, ISMAIL-IBN-ALI** (1273-1331). Arabian writer and warrior. Born at Damascus, he distinguished himself as a military leader, especially against the Crusaders. In 1312 he was made prince of Hamah, in Syria. His best-known writings are an

An English translation was published in 1730, and the original text at Kazan in 1825 and St. Petersburg in 1871.

**Abulug.** River of Luzon, Philippine Islands. It rises in the Cordillera del Norte and flows N.E. some sixty miles to the N. coast of the island, through a valley rich in tobacco, rice, and maize.

**Abu Mansur Muwaffaq** (d. c. 950). Persian physician. He wrote nearly a thousand treatises on simple drugs and a pharmacopoeia called *The Foundations of the True Properties of Remedies*, in which 585 drugs are described, the information being drawn from Greek, Syriac, Persian, Arabian, and Hindu sources. The first medical book in modern Persian, it is also one of the earliest prose works in that language.

**Aburi.** Health station, British Gold Coast Colony, 25 m. N.E. of Accra. In the Aquapim Hills, at alt. of 1,400 ft. it has a sanatorium and botanical gardens.

**Abushere.** Variant spelling of the name of the Persian port Bushire (q.v.).

**Abyssal Deposits.** Geological deposits formed in the deeper parts of the oceans, and characterised by the absence of all but the very finest particles of sediment derived from land areas. They are usually fine-grained oozes, mainly derived from the hard parts of minute unicellular organisms such as foraminifera, radiolaria, coccoliths, and diatoms, which live at or not far below the surface waters, and whose dead "shells" sink very slowly to the bottom. A certain amount of volcanic ash and wind-blown dust also settles in these parts of the oceans. The area covered by abyssal deposits amounts to about half the surface of the world; yet they are rarely found with any subsequent strata overlying them.

**Abyssinia.** Independent state of N.E. Africa, also called Ethiopia. It is bounded on the W. by the Sudan, E. by the Red Sea and French and British Somaliland, S. by Kenya and (Italian) Somaliland. With a greatest extent of 1,000 m. from W. to E. and from N. to S., Abyssinia resembles a triangle, the apex being towards the N. Area (including Eritrea) about 395,000 sq. m. Abyssinia may be divided into four distinct zones: (a) the narrow maritime plain; (b) the maritime ranges, generally parallel with the coast; (c) the raised undulating plateaux which culminate in the Harar highlands, and are continued S. in the hilly country that forms the basins of the Webi-Shebeli (Wabi-Shevgli) and the Juba; and (d) the region bordering the Sudan, which is mountainous, rising gradually from the W., and intersected by numerous deep valleys and remarkable ravines, some nearly 4,000 ft. in depth.

The mountains of this last region are rugged and precipitous, particularly towards the E. The eastern wall of the interior highlands runs due S. until it reaches the valley of the river Hawash. Here the main range bends to the S.W., while another chain continues S. From this a third range runs E. towards the Gulf of Aden. The loftiest peaks are found in the Simyen range, where the snow-capped summit of Ras Dashan, N.E. of Lake Tsana, reaches 15,000 ft. The principal rivers forming the head-streams of the Abbai, or Blue Nile, issue from Lake Tsana, near which the Atbara, also a tributary of the Nile, takes its rise. None of the rivers of Abyssinia is navigable, except for small craft. During

the rainy season torrential waters of the Blue Nile and the Atbara cause the annual Nile flood in Egypt; yet in the dry season these rivers almost cease to flow.

In spite of its tropical latitude, most of Abyssinia, owing to its elevation, has an agreeable climate, but in the deep valleys and southern plains and on the Red Sea coast the heat is often oppressive. The rainy season proper extends from Mid-June to Oct.

**PEOPLE AND LANGUAGE.** The population of Abyssinia, estimated at about 10 million, consists of a diversity of peoples speaking a diversity of languages. On the plateau, especially to the N. of Addis Ababa, dwell the groups forming the Abyssinians proper, referred to generally as Amhara, who have become dominant in the country. They speak a Semitic language, an old form of which is still extant in the sacred language of their priests and is closely allied to the ancient Sabæan; Amharinga, Tigrenga, and Guragheh are the main current dialects. Also on the plateau, surviving in scattered communities (e.g. the Agao to the S.W. of L. Tsana), are remnants of another peoples whose languages are Hamitic. Another small part of the population is formed by the Nilotic groups in the S.W., e.g. the Anuak. Most of the rest of the country is occupied by Hamitic groups; in the S. and

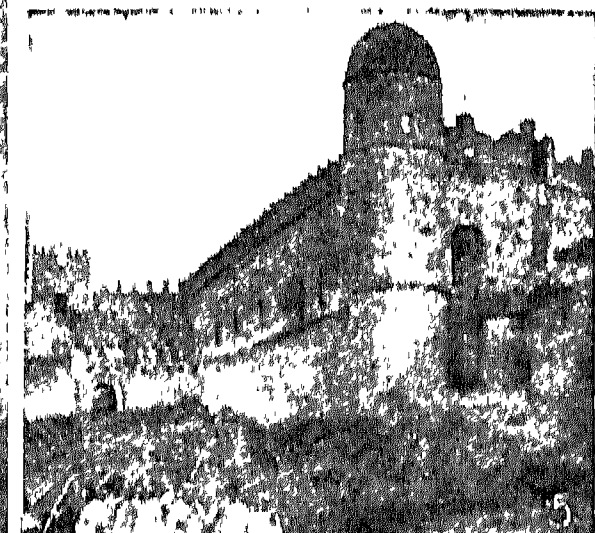
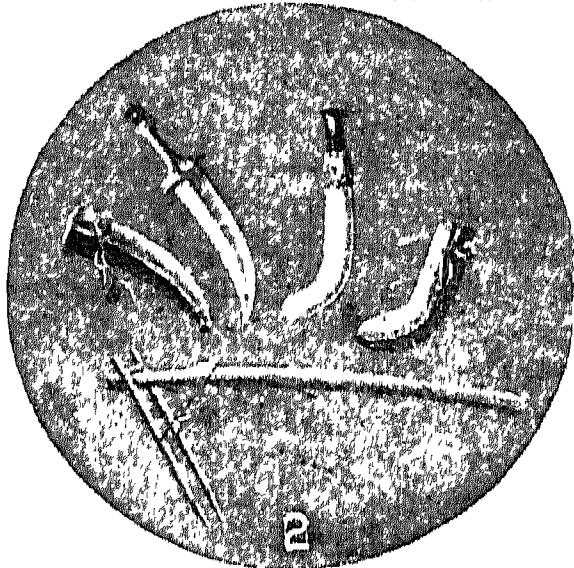
W. live the Galla, Sidama, and related peoples, while the E. is occupied by Somali and Danakili. There are also small groups of Bantu along the southern rivers (e.g. along the Webi-Shebeli), and elsewhere of Falasha (Jews), Arabs, Indians, etc.

**RELIGION.** The Amhara are Christians, and so too are some of the Gallas. The rest of the Gallas, the Somalis, and the Danakili are Mahomedans, with an admixture of pagans. The Bantu and Nilotic groups are pagan. The Falashas are Jews.

The Abyssinian Church, or Church of Ethiopia, is a branch of the Coptic Church of Egypt, and dates from the 4th century, when Athanasius of Alexandria consecrated Frumentius its first metropolitan or abuna. Since that time the abuna has been a Coptic monk chosen by the Coptic patriarch in Egypt, except when the ruler himself has taken the office. Frumentius found Jewish rites existing with traces of Christianity. The Christianity is still mixed with Judaic and pagan customs, though it approximates somewhat closely to the Greek form, the chief distinction being the profession of Monophysitism—i.e. that in Christ was but one nature, the divine, a heresy adopted in the 5th century. There are many monasteries and convents under the control of native-born bishops. In the 16th







1. Chief of the Oualamo tribe. 2. Primitive agricultural implements of the Oualamos, with two of their daggers and dagger cases. 3. Ceremonial costume of a woman of Harar. 4. Abyssinian girl. 5. Governor's castle

at Gondar. 6. Typically rugged country seen from the caravan route between Addis Ababa and Dessale. 7. Native farmer crushing grain with a pestle and mortar. 8. Street in the ancient market town of Harar

**ABYSSINIA: PEOPLE AND PLACES OF AN ANCIENT AND STILL PRIMITIVE LAND**



into force on Nov. 18, 1935. Italy promptly retorted by banning trade with any nation that acted on the League embargo. Meanwhile she had pressed forward with the war, occupying the holy city of Aksum on Oct. 14. General de Bono, the Italian commander-in-chief, issued a proclamation on Oct. 19 abolishing slavery in occupied Abyssinia. Early in November General Graziani advanced from the S. across the Italian Somaliland frontier. At the end of the month de Bono was replaced by Badoglio. After some setbacks the Italians, with the help of aerial bombing and the use of poison gas from the air, swept on to the occupation of Neghelli (Jan. 22, 1936), Amba Alagi (Feb. 28), Gondar (April 2), and Dessie (April 15). The emperor fled from Addis Ababa on May 1, reaching Haifa a week later in the British cruiser *Enterprise*, which had taken him off from Jibuti. Badoglio occupied the capital on May 5, the day on which Mussolini announced the end of the war and the annexation of Abyssinia. Graziani occupied Harar and Dire Dawa on May 9, the two Italian forces meeting at Dire Dawa the following day.

Mussolini announced that Abyssinia was now under the rule of king Victor Emmanuel III, who assumed the title of emperor of Ethiopia. Badoglio was appointed viceroy and governor-general. A decree of June 1 constituted the new colony of Italian East Africa by the joining together of Eritrea, Ethiopia, and Italian Somaliland. Haile Selassie made a moving address in person to the Assembly of the League of Nations on June 30, but the League took no further action on his behalf. The arms embargo against Italy was raised on July 14.



Abyssinia. British officers with some of the troops they trained secretly before the campaign of 1941



Abyssinia. Native chiefs and soldiers swearing allegiance to the emperor Haile Selassie on his restoration in 1941 *Photo, British Official*

Graziani succeeded Badoglio (created duke of Addis Ababa) as viceroy on June 11, 1936, and was himself succeeded by the duke of Aosta on Nov. 21, 1937. Germany recognized the Italian conquest of Abyssinia on Oct. 25, 1936, and her recognition was followed at intervals by that of most of the other governments, including that of Great Britain (Nov. 16, 1938). But Italy never completely subjugated the province of Gojjam, bordering on the Sudan.

During the occupation Italy amply provided for defensive and offensive operations. A force of at least 300,000 men, with 400 guns and 200 aircraft, was on the spot, and of these some 100,000 were stationed near the Sudan borders. Her position, therefore, in view of the general weakness of the British in East Africa, seemed assured.

#### The Liberation of 1941

In June, 1940, shortly after Italy's declaration of war against Great Britain, Italian troops invaded the Anglo-Egyptian Sudan, British Somaliland, and Kenya. Italy also used Eritrea as the

base for naval operations on the vital Red Sea communications. These contingencies had, however, been foreseen. In the Sudan, Abyssinian refugees had been trained to be the first modern Abyssinian field force, under able British officers. In Kenya a similar but smaller force had been prepared. To aid the local contingents,

South Africans trekked through central Africa to Kenya and Indian forces were massed around Kassala and Gedaref, in the Sudan, and on the Red Sea coast. There were thus two main bases for British operations against Italian East Africa. From Khartum came the forces operating against Eritrea and Northern Abyssinia. From Nairobi came those which conquered the coastal territories of Italian Somaliland and advanced north-west to Addis Ababa.

Early in July, 1940, a handful of British officers and N.C.O.s had crossed the borders of Abyssinia with an important convoy of arms. After trekking for many weeks through mountainous country and jungle they reached their headquarters some 500 miles within the borders of Ethiopia, where they undertook to train Abyssinian patriots in the use of modern firearms and to raise the standard of revolt. The Italians failed to locate the groups of patriots either on the ground or from the air, and never foresaw the growth of a hostile army.

After six months the British officer in charge of the mission was able to report to Haile Selassie that an army was trained, equipped, and ready to attack, and that the men were awaiting the presence of their emperor.

On Jan. 20, 1941, Haile Selassie crossed the border, and unfurled the standard with ceremonial and religious ritual. Drum telegraph carried the news throughout the land, and the revolt of the patriots began. Besides the two armies of the N. (patriots and Imperial troops) and the S. (patriots and South African troops) two other forces attacked, one from the E. and one from the S.E. The operations in Abyssinia took the form



1795 as one of the four classes (now academies) of the National Institute, was authorized to "resume its old name and regulations." Since then its history has been uneventful. The chief aim of the Academy is to safeguard the purity of the French language. Its first work was a criticism of the *Cid* of Corneille (1637). In the same year it undertook the compilation of a definitive French dictionary. This, published in 1694, has since been under constant revision; it is the stand-by of all French authors. The Academy remains a dominant literary influence; when there is a vacancy, would-be members have personally to canvass the actual members.

**Académie Goncourt.** French literary society. Founded by Edmond de Goncourt in 1896, its purpose is to foster the work of young authors. There are 10 members, chosen from the members of the Académie Française, to which de Goncourt himself belonged. An annual prize is awarded for the year's best novel.

**Académie Nationale de Musique.** Official title of the Opéra in Paris. It was founded in 1669 by Louis XIV as the Académie Royale de Musique; it has had many famous directors, *e.g.* Gluck, Rossini, Meyerbeer, Gounod, Saint-Saëns, and Massenet. The imposing building housing it dates from 1875. The Conservatoire de Musique was opened in 1784 as a training ground for the Opéra; but it has since extended its range, which now includes every kind of musical training.

**Academy** (Gr. *akademía*). Originally the name of a public park and gymnasium N.W. of Athens, named after its supposed former owner, the hero Academus. In its olive groves Plato taught for nearly 50 years, and after his death it remained the haunt of Greek scholars until Justinian closed the old pagan schools in A.D. 529. Phases in the interpretation of the Platonic doctrines have been named the Old, the Middle, and the New Academies.

The term is now most exactly used in reference to any society for the disinterested pursuit of one or more of the arts and sciences. In this modern sense the earliest academy was the Museum at Alexandria founded by Ptolemy Soter during the 3rd century B.C. Here the finest scholars came from Greece and from the East, all the known arts and sciences were taught, and a great library came

into being. The Jews, and later the Arabs, took it as model for their own learned institutions. Alcuin formed a similar establishment for Charlemagne at St. Martin's, Tours, in A.D. 796. Belgium is said to have had an academy in the 12th century, and the Academy of Floral Games, founded at Toulouse in connexion with the Troubadours, has continued in existence to modern times. But it was in Italy, during the Renaissance period, that the academy, as an association of learned men, attained to fuller development. Under Cosimo de' Medici (1389-1464) was founded the Platonic Academy, the chief representative of which was Marsilius Ficinus; other academies were associated with the names of Laurentius Valla

portant include the Royal Society (1662), the Royal Institution (1799), the British Association for the advancement of science (1831), the Royal Academy of Arts, the British Academy for the promotion of historical, philosophical, and philological studies, the Royal Geographical Society (1830), the Royal Historical Society (1868), and the Society of Antiquaries (1751).

**IRELAND.** The Dublin Royal Society (1750); the Royal Irish Academy (1752); the Royal Hibernian Society (1803).

**FRANCE.** In addition to the five academies that compose the Institute of France, there are the Académie de Médecine (1820), the National Society of French Antiquaries (formerly the Celtic Academy, founded 1805), and

academies in leading provincial cities.

**BELGIUM.** The Royal Academy of Science, Letters, and Fine Arts, Brussels (1773).

**HOLLAND.** The Royal Netherlands Institute of Sciences, Amsterdam (1808), and learned societies at Rotterdam, Utrecht, Haarlem, and Middelburg.

**PORTUGAL.** The Lisbon Academy of Sciences (1779).

**SPAIN.** The Royal Spanish Academy, founded in 1713

for the study and preservation of the Castilian language.

**SCANDINAVIA.** The Royal Danish Academy of Sciences, Copenhagen (1742); the Royal Society of Sciences, Trondheim (1760); the Royal Swedish Academy of Sciences (founded, 1739, by Höpken and Linnaeus); the Academy of Uppsala for the study of Scandinavian languages (1720); the Societas Scientiarum, Helsinki (1838).

**RUSSIA.** Academy of Sciences of the U.S.S.R., formerly the Imperial Academy of Sciences, founded by Catherine the Great.

**ITALY.** Accademia Nazionale dei Lincei, Rome (1603); and many academies in other principal



Academy. Plato's academy derived its name from the grove of Academus, near Athens. This mosaic is believed to represent the philosopher teaching in his shady retreat.  
*Mosaic from Pompeii; Nat. Mus., Naples*

(Academy of Naples) and Pomponius Lactus (Academy of Rome). The Accademia della Crusca set the standard of the modern written language of Italy. Another early Italian academy was the Accademia del Cimento, founded in 1657 with the object of carrying on scientific experiments.

Below is a list of the leading academic or similar institutions in different countries:

**GREAT BRITAIN.** The number of societies and associations devoted to various branches of learning in Great Britain, the Dominions, and the Colonies is very large. A list is given in the Year Book of Scientific and Learned Societies. The most im-

**Accademia della Crusca.** Italian learned society, founded in Florence during the second half of the 16th century. It adopted the name *crusca* (bran or chaff) as an indication that its aim was to separate good Italian from bad; and in 1612 it issued a dictionary which set the standard of the written language of Italy. In 1783 it combined with other societies to form the Reale Accademia Fiorentina (royal Florentine academy), but resumed independent status in 1811. *See also* Della Crusean School.

**Acceleration.** In mechanics, the rate of change of velocity. In ordinary speech, acceleration indicates an increase in speed. If a car is travelling at 30 m.p.h. at the beginning of any given second, and its speed is increased so that it is travelling at 40 m.p.h. at the end of the second, then it must have accelerated by 10 m.p.h. in one second. Ten miles per hour is  $14\frac{2}{3}$  ft. per sec., so that the acceleration of the car (if maintained) may be expressed as  $14\frac{2}{3}$  ft. per sec. per sec. (in every second the car increases its speed by  $14\frac{2}{3}$  ft. per sec.). In the metrical system the unit of acceleration is 1 cm. per sec. per sec., sometimes written as  $1 \text{ cm.}^{-2}$ .

In scientific usage, acceleration may be negative as well as positive; when negative it refers to decrease instead of increase in speed. There is a distinction also between speed, which may be along any path, straight or curved, and velocity which presupposes the direction as well as the speed of the motion. Thus any change of direction in the motion of a body is also an acceleration, and acceleration, like velocity, is strictly a vector rather than a scalar quantity.

For motion at constant speed,  $v$ , in a circle of radius  $r$ , the acceleration is  $v^2/r$  towards the centre of the circle. This is the centrifugal acceleration and is also equal to  $\omega^2 r$ , where  $\omega$  is the angular velocity for the circular motion. For motion in other curved paths, the acceleration has two components at every point: the radial acceleration normal to the tangent to the curve; and the tangential acceleration in the direction of the tangent. The acceleration due to gravity is about 32.2 feet per sec. per sec. at the earth's surface and is the ratio of weight to mass of a body.

**Accent.** Prominence given to a particular syllable of a word in pronunciation. There are two chief kinds of accent, pitch (musical, tone) accent, and stress (emphatic) accent. Stress accent predominates in modern European

languages, and frequently indicates a different meaning or shade of meaning, as in *cônduct*, *con-duct*; German *umstellen*, surround, *âmstellen*, transpose. In some non-European languages, notably Chinese, pitch accent is much more important.

The term accent is also applied to each of certain marks used to indicate pronunciation. Those now most commonly used, *e.g.* in French, are derived from the Greek system of accentuation, attributed to Aristophanes of Byzantium (200 B.C.). In French, they are the acute, *i.e.* sharp, or rising ( ' ), the grave, *i.e.* heavy, or falling ( ` ), and the circumflex, *i.e.* bent round, or rising-and-falling ( ^ ); the use of the circumflex generally indicates the dropping out of a consonant before another consonant, *e.g.* *bête* for *beste*, *âme* for *anme* (Latin *anima*). Certain other marks called diacritical are not strictly accents though they serve as guides to pronunciation. The cedilla ( ¸ ) is placed under *c*, chiefly in French and Portuguese, when the letter is to be sounded as *s*, not as *k*. In English the diaeresis ( ¨ ), from Greek *diakrein*, to divide, is placed over the second of two vowels to show that each vowel is to be pronounced separately, and the grave or acute accent is occasionally used in poetry over the *e* in *ed* to show that it has to be pronounced as a separate syllable, *e.g.* *learnèd*. In Spanish the tilde ( ~ ) and in Polish ' are placed over *n* (*ñ*, *n*) to indicate the *y* heard in English in *poniard* (*cañon*, *Poznań*). In the Teutonic and Scandinavian languages modifications in the sound of the vowels are expressed by certain marks (*Åbo*, *Götter*). Diacritical marks are used in certain Oriental languages.

In music, accent is (1) a regularly recurring stress on certain notes; (2) a special stress on notes not normally accented, indicated by *acc.*, *sf.*, *fz.*, and other signs.

**Accentor.** *See* Hedge Sparrow.

**Acceptance.** In commerce the act by which a person on whom a bill of exchange is drawn agrees to pay the bill when due. He accepts it by writing his signature (with or without the word "accepted") across the face of the bill. An acceptance may be either general or qualified. A qualified acceptance varies the terms of the bill as to time or place of payment, etc.

**Access, RIGOUR OR.** In the British parliament, the privilege of direct intercourse with the sovereign is still formally claimed by the Speaker as one of the "ancient and

undoubted rights and privileges" of the Commons. It is a relic of the time when the monarch took a much more direct part in the government of the country than he or she does to-day. Refusal to hear an individual petition, or still more to hear a petition of the Commons, might have caused serious difficulties; hence steps were taken to keep the right alive. Right of access is enjoyed by the house of commons collectively, through their Speaker; peers and privy councillors have an individual right of access to the sovereign.

**Accession** (Lat. *ad*, to; *cedere*, to come). In the United Kingdom and other monarchical countries, the act of acceding to the throne; to be distinguished from the coronation or enthronement, which usually takes place later. In England the formality of an election was abandoned after the time of Edward I, and a sovereign succeeds to the throne of the U.K. immediately his or her predecessor is dead. On accession, at a meeting of the privy council, the new sovereign takes an oath to govern according to the laws of the land and is then proclaimed.

**Accession.** In law, a mode of acquiring ownership in property. Where some thing exists and there is added to it by nature or labour some new thing, the addition belongs to the owner of the principal thing. Thus the ownership of animals carries with it the ownership of their young. The ownership of trees and plants taking root in the ground belongs to the owner of the land, though they were planted by another.

**Accessory.** Term used in criminal law with reference to felonies to denote that while a person may not have taken a principal part in the commission of the offence, yet he has incurred some degree of criminal responsibility. Accessories are of two kinds; accessory before the fact and accessory after the fact. An accessory before the fact is one who, though absent at the time the felony was committed, yet procured, counselled, or abetted another to do it. If such a person were present he would be a principal in the second degree. An accessory before the fact is liable to the same punishment as the principal.

An accessory after the fact is one who, knowing that a felony has been committed, relieves, receives, comforts, or assists the felon so that he shall escape from justice. An accessory after the fact is in general liable to imprisonment for

accidents which cause loss of life of an employee, or disable him for more than three days from earning full wages—must be notified to the factory inspector. All boiler explosions must be notified to the Board of Trade within 24 hours, and the board may order an investigation. The Home secretary may also direct that an investigation be held into any accident.

The Factories Act, 1937, and regulations made under that act contain most detailed provisions designed to reduce the risk of accidents in factories; many of these provisions make the owner or occupier liable to a fine if they are not observed. Unless the act or regulation imposes some other penalty, the maximum penalty is a fine of £20, and, where the offence is a continuing one, a fine of £5 a day. Where any person is killed or suffers bodily injury because of a contravention of the act or regulation, the maximum fine is £100, and the money may be given to the injured person or his family.

**RAILWAY ACCIDENTS.** Notice must be given to the minister of Transport and Civil Aviation of accidents involving death or injury to any person or of accidents in which a passenger train is involved in a collision or where a passenger train leaves the rails and in certain other specified circumstances. The minister may direct an inquiry by an inspector or a public investigation, and when a death has occurred may, if requested by the coroner, appoint an inspector to sit with him as an assessor at the inquest.

Claims to compensation in respect of death or injury to a passenger on a railway are governed by the ordinary common law rules under which liability depends on negligence. A collision or causing a train to leave the rails is evidence of negligence, as also is overcrowding on a platform or in a carriage, failing to shut a carriage door properly before a train leaves a station, or allowing a platform to become dangerous because it is badly lit or slippery, as with ice, unless in the last instance passengers are warned or steps are taken to remove the danger. Railways are now prohibited by law from making special contracts with passengers limiting the railway's liability for death or injury.

The liability of the railway in respect of goods lost or damaged is similar to that of other carriers.

**ROAD ACCIDENTS.** See under *Motoring*.

**COAL MINES.** Accidents causing death or serious injury and accid-

ents causing any personal injury if due to certain causes—*e.g.* explosion of gas—must be reported to the local inspector of mines. The ministry of Fuel and Power may direct an inspector to make a special report if loss of life or personal injury is caused, and the ministry may direct a formal investigation to be held.

The Coal Mines Act, 1930, contained many provisions to reduce danger, and infringement of many of these is an offence. The fine for any offence involving loss of life or personal injury may be given to any person injured or the relatives of anyone killed.

**INDUSTRIAL INJURIES.** Apart from any rights to claim a lump sum as compensation under common law or under a statute such as the Factories Act, 1937, there are the rights to weekly benefits under the National Insurance (Industrial Injuries) Act, 1946. These benefits are independent of any negligence or fault on the part of the employer and are administered by the ministry of Pensions and National Insurance as part of the social services. They are payable to all persons employed in insurable employment if they suffer personal injury by accident arising out of and in the course of their employment. They replace the payments under the Workmen's Compensation Acts, 1897–1945.

**ACCIDENTS AT SEA.** When an accident occurs to a British steamship, or a foreign steamship carrying passengers between places in the United Kingdom, which occasions loss of life or serious injury to any person or material damage to the hull or machinery affecting the ship's seaworthiness or efficiency, the accident must be reported to the ministry of Transport and Civil Aviation. A preliminary inquiry may be held into any shipping casualty by a coastguard or customs officer or a person appointed by the ministry, and a formal investigation followed by a report to the ministry may be held by a court of summary jurisdiction or a wreck commissioner with the assistance of one or more nautical or other expert assessors.

The liability of a shipowner for the death or injury of a passenger is generally governed by the special contract contained in the ticket issued, and the shipowner is free to limit his liability in this ticket to such extent as he pleases. In the absence of a special contract the duty of the shipowner is to take reasonable care of the passenger. When persons are killed

or injured, whether on the ship or on some other vessel, the shipowner's liability, where the death or injury, although due to some negligence, has occurred without the shipowner's actual fault or privity, is limited in respect of each occasion on which such death or injury occurs—*e.g.* each collision—to an aggregate of £15 per ton of the ship's tonnage.

**OTHER ACCIDENTS.** Accidents may arise in a multiplicity of circumstances. For example, a person may be injured by tripping over some projection or slipping on some slippery surface on the pavement or in a shop or hospital, cinema, or other public building, or through being struck, while walking on the highway, by a falling tree, or a shop sign, or by a slate or accumulated snow from a roof, or being supplied with injurious food in a shop or restaurant, or by the collapse of a chair he has hired at the seaside. In some circumstances, a person injured will be entitled to rely on some contract he has entered into while in others he will rely on the law of negligence or on special duties owed to him by reason of his position as an invitee or a licensee; but very often he will not be able to secure compensation.

**DISASTROUS ACCIDENTS.** Among accidents involving serious loss of life mentioned in this Encyclopedia are: the loss of the Birkenhead and the Titanic (*qq.v.*) and of the ferry steamer Princess Victoria (see Donaghadee); of an air liner in South Wales (see Sigginston), and of the R101 (*q.v.*); railway disasters at Greta Green, at Harrow, and at Nashville, Tenn. (*qq.v.*); the burning of the Noronic (*q.v.*) at Toronto, of the Bazar de la Charité (*q.v.*), Paris, and of the munitions factory at Silvertown (*q.v.*).

**Accident.** In logic, a non-essential quality of a person or thing. Ink, whether black or red, is still ink; a man, virtuous or vicious, is a man. Blackness, redness, virtue, vice, are accidents. Non-essential qualities were considered not to be necessarily, or causally, connected with their subject, hence the meaning of fortuitous, or merely accidental, which arose.

**Accidental.** In music, a sign for temporarily raising or lowering a note, *i.e.* altering the pitch by sharp, flat, or natural.

**Accident Proneness.** State described in some individuals who repeatedly injure themselves, often sustaining fractures. This self-



reserve accounts, and the undistributed income. This type of balance sheet is common to all forms of undertaking; but undertakings which are not primarily in existence to make profits, such as learned societies, charitable bodies, and friendly societies, compute their net income or deficit for the period in an income and expenditure account.

The method of constructing the account for income, the profit and loss or income and expenditure account, is to show on the credit or right hand side the gains or income for the year, and on the debit or left hand side the losses or expenses for the year, the difference representing the net profit (or loss) or the surplus (or deficiency).

In former times the strict computation of annual income was not an important matter, since normally profits were not divided annually, and although the early teachers of accounts called for the periodical balancing of the books, profits or losses were not normally declared until the trading venture was completed; the early joint stock trading companies frequently shared out capital and profit to the subscribers when the voyage or venture for which such a company had been formed came to an end. As the character of trade changed, and production and industry became continuous, a widespread body of shareholders became interested in profits, and the state called for payment of income tax based on annual profits, so that the preparation of accurate accounts showing the annual net gain of each undertaking became vital.

#### Profit and Loss Account

The profit and loss account sets the expenses of the year against the corresponding income; but one of the major problems of accounting is to compute charges on a correct basis where the benefit of expenditure extends over more than one accounting period. This type of problem is called the distinction between capital and income. Thus a machine will perhaps be useful in production for ten years; it would obviously be inaccurate to charge the whole of its cost against the income of the year of its purchase; so its cost will be charged against income over its estimated life, the charge being called depreciation. The simplest method of calculating depreciation is to spread the cost equitably over the machine's estimated life, the straight-line method; there are other methods suitable for other types of property, particularly

such items as long leases. Broadly speaking, the object is to charge against profits each year a reasonable part of original cost; but where there has been a general rise in prices, including the replacement costs of plant, it is prudent to increase the charge to cover the replacement rather than the original (or "historical") cost. Expenditure is said to be capital expenditure, in general, when its benefit is likely to extend over more than one accounting period; this may be held to justify treating as capital expenditure some part of advertising costs, and similar items sometimes called deferred revenue expenditure, but the valuation of these is a matter calling for prudence.

Whereas a profit and loss account is an account showing the income and expenses during a defined period, a balance sheet is a statement of the position of a business at a stated date; as between two dates, the successive balance sheets will show the position on each, and the profit and loss account shows in summarised form the transactions between the two dates and forms the connecting link between the net worth shown by the two balance sheets.

In the U.K., the form and the contents of the annual accounts are, for certain bodies, governed by statute; these include building societies, provident societies, insurance companies, unit trusts, and friendly societies. The directors of limited companies, under the consolidated Companies Act of 1948, are required to lay before the shareholders a profit and loss account and a balance sheet each financial year, but there is no prescribed form or content, beyond the direction that they must each give a "true and fair view" of their subjects. Public companies (*i.e.* mainly those having more than 50 members and raising their capital from the general public) must lodge these accounts with the registrar of companies where they are open to general inspection, and are therefore usually drawn up so as to give the details prescribed by the Act, particularly the eighth schedule thereto, but not much more. The accounts of nationalised undertakings, for example the coal board, are required to be prepared either to show specified particulars, or generally in accordance with commercial practice, and laid before parliament.

In certain types of undertaking expenditure may be limited in accordance with a budget; for ex-

ample, in a college working on a grant, in a hospital, or a society working on an annual subscription, it is necessary to limit expenditure on the various items of outlay so as to secure the maximum benefit from funds available. It is accordingly desirable to set up a system of accounts such as will provide at the end of each month, or other period, the expenditure under each head for comparison with the budget. Information given by the accounts will then indicate the need for curtailment or the possibility of expansion, month by month within the budget. This system of budget has been extended to commercial undertakings, providing for some flexibility according to the volume of sales and thus of available income.

The annual profit and loss account will show the total costs, the total income, and the net profit, but does not in itself give any information on the cost of each unit of output. Cost accounts, which tell the management the cost of each unit of output in terms of labour, material, and expense, are therefore often prepared to enable the management to assess efficiency of methods and materials as compared with standard costing set up in advance.

#### Management Accounting

It was formerly customary to arrange the ledger accounts and to classify expenditure and income in such a way as to fit in with the form of the annual statement of accounts to be laid before the owners. A later tendency is to arrange the accounts in such a way as to yield at all times the maximum information required by the management. The principal call for this has been in connexion with standard costing, but the scope of what is called management accounting goes beyond this. Thus dissection of sales and the preparation of departmental profit and loss accounts will reveal those departments and lines which can profitably be expanded; the preparation of four-weekly trading accounts will indicate more clearly than those for calendar months the trend and variation of business; the computation of average stocks in successive accounting periods and their comparison with the cost of sales will reveal variations in the rate of stock turnover and make it possible to keep stocks at a minimum.

The Companies Act, 1948, contained regulations concerning the annual accounts of groups of companies in which, without com-

variable. An accumulator which stores up water under pressure when the demand on the pump is low, and releases it when the demand exceeds the pump delivery, smooths out the fluctuations so that a smaller but continuous-running pump can be used.

Hydraulic accumulators fall into two main groups: a fixed vertical cylinder fitted with a loaded ram; and a fixed vertical ram fitted with a loaded cylinder. The first type is illustrated in fig. 1. The movable ram is heavily loaded with weights which tend to force it downwards. Piping connected to the cylinder is laid to the various hydraulic machines to be served. The accumulator is charged by pumping water into the cylinder at the lower end. This lifts the loaded ram to the top of its stroke and, when the cylinder is full, the water supply is automatically cut off. The pressure in lb. per sq. in. exerted by the ram upon the column of water is  $W/A$  where  $W$  is the weight of ram plus its load in lb., and  $A$  is the cross-sectional area of the ram in sq. ins.

When water is drawn from the cylinder, the descending ram maintains a uniform pressure on the water. As soon as water is drawn off, the pumps automatically come into action to maintain the necessary supply in the cylinder. By this means the pumps, which could not directly maintain a con-

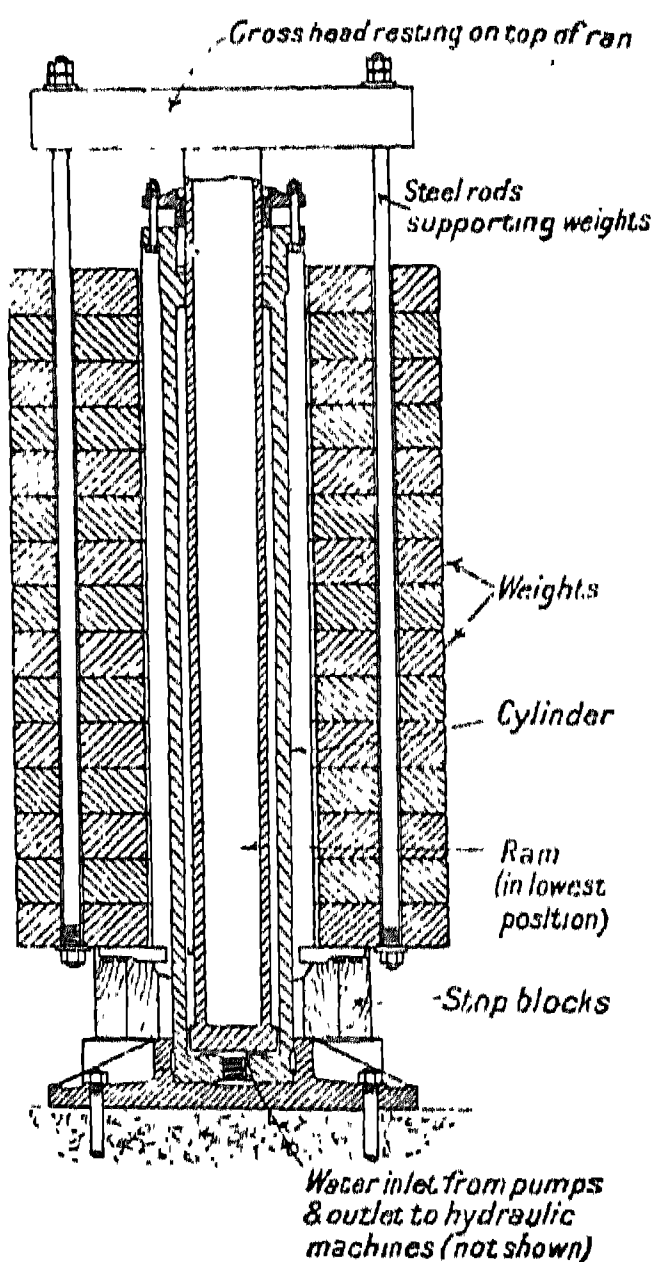


Fig. 1 Hydraulic Accumulator

stant pressure supply to meet the fluctuating demands of the machines, can perform their duty satisfactorily. Working pressures obtained in this manner usually range from 700 lb. to 1,500 lb. per sq. in., although much greater pressures can be obtained. The only auxiliary power required is that for driving the water pumps.

The main principle of the differential accumulator (fig. 2) is the same, but a second and larger cylinder is superimposed on the first, and the top end of the ram is fitted with a larger piston working in this upper cylinder. Valves and piping control the number of pistons used, thus giving a choice of working pressures.

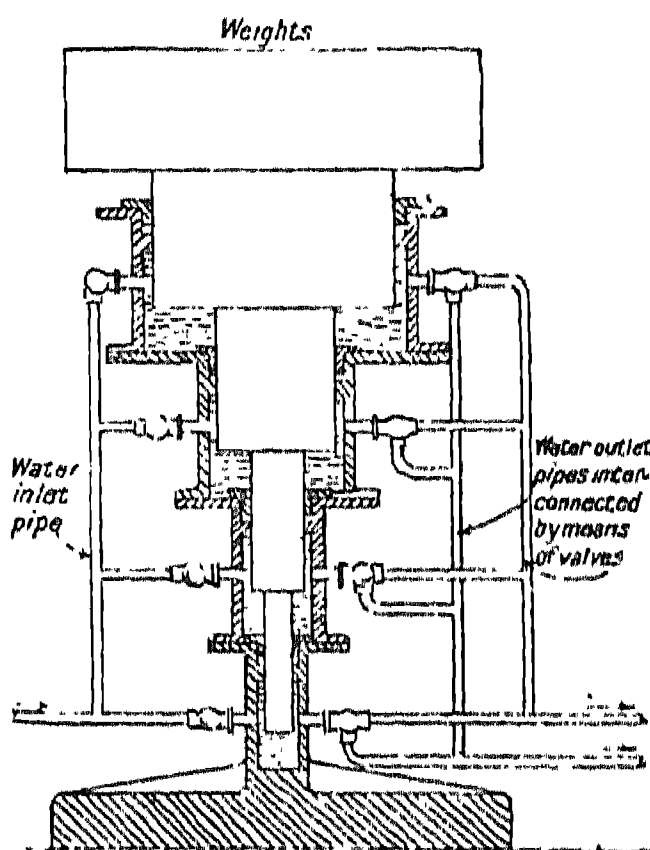


Fig. 2 Differential Accumulator

Under the pressure imparted by an hydraulic accumulator, water can be regarded as a flexible piston rod; being almost as incompressible, it instantly communicates pressure imparted at one end throughout the length of a pipe. Pressures of many thousands of tons can be obtained from a single hydraulic press. The hydraulic accumulator remains indispensable for heavy work where great pressures are required.

**STEAM ACCUMULATOR.** This, shown in fig. 3, is a modified form of hydraulic accumulator in which steam pressure is substituted for water pressure to load the ram. A steam cylinder is fixed above the hydraulic cylinder, in which works a piston, secured to the upper end of the ram. Steam is admitted to the upper cylinder, which is of much larger diameter than the hydraulic cylinder and, acting upon the larger piston area, exerts a constant pressure upon the ram. By proportioning the areas of the steam piston and the ram, a com-

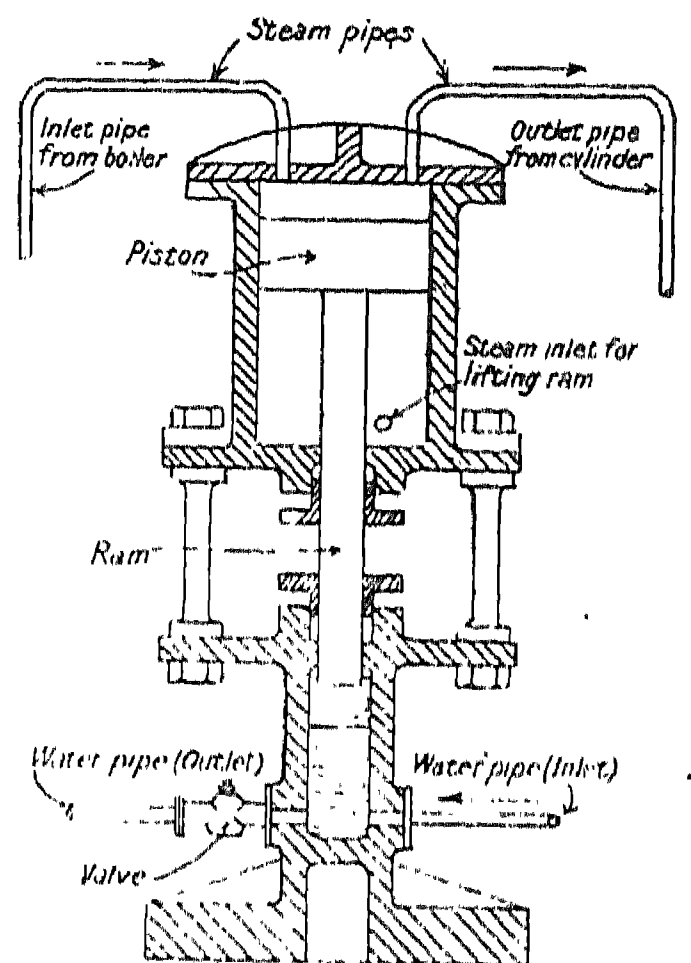


Fig. 3. Steam Accumulator

paratively low steam pressure can be made to exert a far greater pressure per sq. in. on the ram. By varying the steam pressure, any desired pressure can be obtained: steam, moreover, while maintaining a steady pressure, provides a cushioning effect as compared with the dead weight of water. It necessitates the use of a boiler for generating the steam.

**PNEUMATIC ACCUMULATOR.** This is a form of hydraulic accumulator similar in action to the steam accumulator, but using compressed air in the upper cylinder.

**ELECTRIC ACCUMULATOR.** This is a secondary cell, storage cell, or "reversible cell," in which electrical energy, passed into the cell as an electric current, is converted into electro-chemical energy and remains inactive until reconverted into an electric current by the discharge of the cell when the terminals of the positive and negative electrodes are connected. An assemblage of such cells is termed a storage battery, to distinguish it from a primary battery. A secondary cell, when charged, resembles a primary cell in that it can generate current, but with the difference that, when exhausted, it can be recharged again and again by passing an electric current through it.

Secondary cells consist essentially of a container and one or more pairs of specially treated plates, or electrodes, immersed in an electrolyte. In each pair there is a positive plate (anode) and a negative plate (cathode). The capacity of the cell depends on the superficial area of the plates exposed to the electrolyte. The

trical treatment may be encountered. The nickel-cadmium type is preferred where the duty calls for close-voltage limits, high discharge rates, and freedom from self-discharge.

**SILVER-ZINC CELL.** This cell (*see* fig. 5), invented by Henri André, was first used in Britain in 1949. It is noted for its lightness and compactness. The smallest standard type, which has a capacity of 0.75 ampere-hour, weighs only  $\frac{3}{4}$  oz., and measures  $\frac{9}{16} \times 1\frac{1}{8} \times 1\frac{1}{2}$  in. An 80 ampere-hour cell weighs only 28 oz.

The positive electrode is silver and the negative is zinc hydroxide, and the alkaline electrolyte potassium hydroxide, which acts only as a conductor. The plates are separated by cellulosic material, which allows good diffusion of the electrolyte. The act of charging converts the silver into silver oxide, and reduces the zinc hydroxide to zinc. The reverse reaction occurs on discharge. The voltage per cell over the greater part of the discharge cycle is between 1.4 and 1.5, the lower figure being at the one-hour rate, and the higher at the 10-hour rate.

There is no gassing during charge, and extremely high charge and discharge rates are possible with relatively low drop in effective capacity. Silver-zinc cells do not deteriorate quickly when stored, do not "boil" at high altitudes or low pressures, operate at temperatures well below zero ( $-30^{\circ}\text{C}.$ ), and high temperature operation is possible up to about  $85^{\circ}\text{C}.$

The cells are robust, and can be charged by any normal equipment able to supply 2.1 volts per cell at the required charging rate. Their cost is relatively high, but for many purposes their light weight makes their cost worth while. Their chief applications are for battery-powered traction equipment; mobile and portable power and lighting equipment; miners' lamps; flash photography; test instruments; electronic equipment.

The capacity of an electrical accumulator is the period for

which a battery will discharge at a particular current multiplied by that current, and is expressed in ampere-hours (Ah). As the capacity, particularly that of lead-acid cells, decreases with increasing rate of discharge, it is usual to state capacity at a given rate of discharge.

The watt-hour capacity is the product of the ampere-hour capacity and the mean volts during the yield of the ampere-hour capacity. With lead-acid cells this diminishes fairly rapidly as the discharge rate increases; with other types the fall is more gradual.

The efficiency of a cell is the ratio of the output to input multiplied by 100. The ampere-hour efficiency of lead-acid cells is approx. 90; that of silver cells is between 90 and 95. In neither type does the rate of discharge materially effect ampere-hour efficiency, but with lead-acid cells the watt-hour efficiency is considerably affected, falling from about 75 at the 10-hour rate to 68 at the one-hour rate. The watt-hour efficiency of the silver-zinc cell is between 80 and 85.

Direct current must be used for charging accumulators. Where the supply is alternating current, it must be converted to D.C. There are two methods of charging batteries: the constant-current or series method with controlled charging rate; and the constant potential method, whereby the charge to the battery is automatically governed by the amount of charge in the battery, *e.g.* by the terminal voltage of the battery.

During charging there is more risk of damage to lead-acid cells than there is to nickel-iron, nickel-cadmium, and silver-zinc cells. *Consult:* The Battery Book, H. V. H. Cross, 1947; Accumulator Charging, W. S. Ibbetson, 1949.

**Accusative.** In inflected languages, the name given to the case indicating the object of action or the goal of motion; in English usually called the objective case. The name derives from Latin *accusativus*, a translation of Greek *aitiatikē*, the "causing" case, *i.e.*

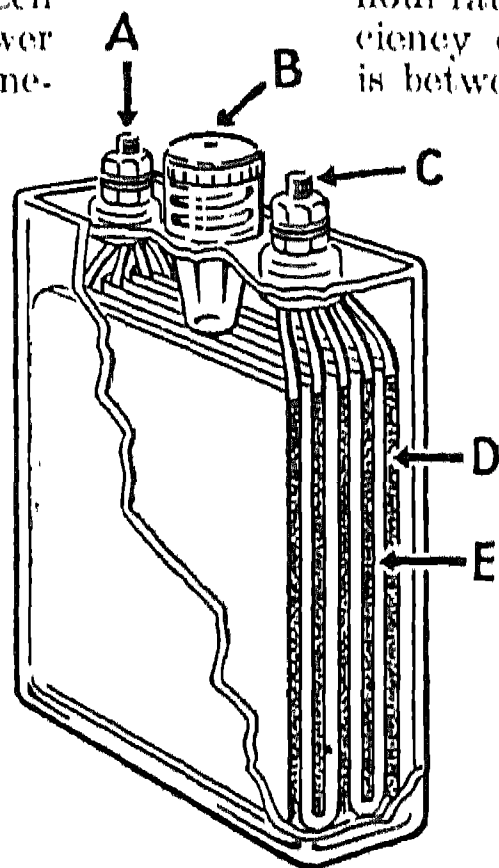
the case showing the cause of action of the verb.

**Ace** (Lat. *as*, a unit). Term originally denoting the side of the dice with a single pip. Hence the expression, when dicing with two cubes, deuce ace, *i.e.* deuce (two) turned up on one die and ace on the other. The term denotes one point in the court games of badminton and rackets. The ace is also the one pip in playing cards. In dice the ace always indicates the lowest; in cards it is often the highest of each suit. With this implication of supreme value the term is colloquially extended to describe air pilots, athletes, and other specialists of exceptional skill in their particular fields.

**Aceldama.** Name meaning, in Aramaic, field or place of blood. The modern Hak-ed-Damm, it is a spot S. of Jerusalem identified with the thirty pieces of silver of Zech. 11, v. 12, and Matt. 27, v. 3, and the Aceldama of Acts 1, v. 19, which Judas bought of the chief priests acquired as a burial-place for strangers.

**Aceraceae** (Lat. *acer*, maple). Large family of trees and shrubs (maples), whose watery sap in some species yields sugar. The leaves are lobed or, more rarely, divided into two rows of leaflets. The flowers are sometimes without petals, massed in corymbs or racemes. The two-lobed carpels develop into the double keys or samaras familiar in the sycamore. Aceraceae are natives of most north temperate countries and of mountains in the tropics. Many species give useful timber, and the bark of some yields brown and yellow dyes.

**Acetaldehyde.** Simple organic chemical compound ( $\text{CH}_3\text{CHO}$ ) commercially important as an intermediate in the manufacture of butyl alcohol and acetic acid. It is a colourless liquid with a pungent, suffocating odour, but at high dilution it has a pleasant, apple-like smell. Isolated by Scheele in 1774, it was more fully investigated in 1835 by Liebig, who obtained it by the oxidation of ethyl alcohol. Since this mode of formation involved the removal of hydrogen from the alcohol, the name aldehyde, from *alcohol dehydrogenatus*, was given to it. Commercial preparation depends chiefly on the discovery by Kutchelow in 1881 that in the presence of mercury salts, acetylene reacts with water to give acetaldehyde. In the presence of catalysts, such as metallic nickel, copper, or zinc, it can be oxidised



Accumulator. Fig. 5. Silver-zinc cell. A, positive terminal; B, filter and vent plug; C, negative terminal; D, negative electrode (zinc); E, positive electrode (silver). The whole is enclosed in a transparent plastic case.



a 35,000 kW. furnace has a capacity of approximately 300 tons of carbide a day. Electricity for carbide furnaces is an important economic item and plants are frequently sited near cheap sources of hydro-electric power. There is, *e.g.*, an extensive carbide-producing installation on the Canadian side of Niagara Falls.

Acetylene production from carbide can be by the "wet" or the "dry" process. In the wet process solid carbide is dropped at a controlled rate into an excess of water; in the dry process approximately equal weights of carbide and water are used so that the heat of the reaction evaporates the excess water.

Acetylene can also be produced by the cracking of saturated hydrocarbons. This is economically favoured where cheap natural gas is available, or where saturated gases can be separated from oil refinery waste gases. Cracking can be by an electric arc (Schoch process); by a regenerative furnace (Wulff process); or by partial oxidation, whereby some of the feed stock (methane or propane) is burned to provide heat for the cracking reactions (Sachser process or autothermic cracking). The acetylene from these processes is usually in low concentration (10% or less) and must be separated and concentrated.

**Achaea** (Gr. Achaia). Name of an ancient division of Greece, the region on the N. coast of Peloponnesus, bounded N. by the Gulf of Corinth. Under the Byzantine Empire Achaea was a despotat or principality; it was conquered by the Turks in 1460.

Achaea (or Achaia) forms a nome of modern Greece, area 1,141 sq. m., pop. (1951) 228,274. Mountainous, with a narrow strip of fertile land along the coast, it is the chief currant-growing district of the mainland. The port of Patras is the capital and chief industrial town.

**Achaean League.** Federation of Greek cities in Achaea. The original association of twelve members, founded in the 4th century B.C., gradually broke up, but in 281 B.C., after the dissolution of Alexander's empire, ten cities formed a league to check Macedonian encroachment. Under Aratus (d. 213) its influence greatly increased, and under Philopoemen (d. 183) reached its height. After the defeat of Macedonia by Rome at Pydna, 168, the sympathies of the members of the league were divided. The Romans seized on

internal dissensions and armed resistance to their demands as an excuse for intervention. In 146 the Achaeans were defeated by the consul Lucius Mummius, and Corinth, then chief city of the league, was destroyed. The league was declared dissolved and Achaea became a Roman province.

The elected head of the league, the strategus or general, exercised control over external affairs and commanded in the field. Legislation and questions of war and peace and alliances were settled by an assembly of citizens over thirty, which met twice a year at Aegium. The member cities retained control of their internal affairs.

**Achaeans** (Gr. Achaioi). In Homer, the general term for all Greeks as opposed to Trojans. The Achaean civilization of Greek folk-memory is now generally identified with the Mycenaean civilization of the archaeologists, which flourished on the shores of the Aegean and the Levant during c. 1450-1200 B.C., and was destroyed by the Land and Sea Raiders (the traditional Dorians) of the Early Iron Age. In historical times the name Achaeans was confined to the inhabitants of Achaea (*v.s.*). Consult Who were the Greeks? J. L. Myres, 1930.

**Acharnians**, *THE*. Comedy by Aristophanes. Performed 425 B.C. during the Peloponnesian war, it supported the peace party. It takes its name from the chorus of charcoal-burners from the township of Acharnae, who favour the continuance of the war until Dicaeopolis, an Athenian citizen, persuades them to join with him in concluding peace with Sparta.

**Achates**. In Roman legend, a follower of the Trojan hero Aeneas. Achates is always distinguished by the epithet *fidus* (faithful), and his name has become proverbial as that of a close friend and companion. *Prom. akayteez.*

**Achelous**. River of Greece, sometimes called the Aspropotamo, or white river. It rises in the Pindus mts., flows S. some 130 m., much of the way through mountain gorges. It divides Aetolia from Aearmania before falling into the Ionian Sea. At its mouth are extensive alluvial deposits. Plans for hydro-electric development were under discussion in 1955. In Greek mythology, Achelous was a river-god, son of Oceanus and Tethys.

**Achensee**. Lake in Tirol, Austria, 20 m. N.E. of Innsbruck. It is about 5 m. long by  $\frac{1}{2}$  m. broad,

and lies amid picturesque mountains at an alt. of 3,000 ft.

**Achernar**. Star in the constellation of Eridanus in the southern hemisphere. Described in the 10th century by the Persian astronomer, Al-Sufi, it is supposed to be identical with  $\theta$  Eridani, a double star. Its name, from the Arabic, means the end of the river.

**Acheron**. In ancient geography, the name of several rivers. The best known was in Epirus. It flowed through the Acherusian lake into the Ambracian gulf, and was regarded with awe as in some way connected with the underworld. Another was in Bruttii, S. Italy. Mythology tells of a river Acheron in Hades, which itself was often called Acheron.

**Acheulian**. Culture of the Lower and Middle Palaeolithic Age in Europe, deriving its name from the type-site at St. Acheul on the Somme, France. It is characterised by hand-axes which become progressively finer in quality. In 1935 a skull was found in the gravels at Swancombe where there are Middle Acheulian hand-axes. Hoxne, Suffolk, is a notable Late Acheulian site. The hand-axe users occupied European sites in the periods of temperate climate between the Mindel, Riss, and Würm glaciations. Other cultures, such as the Levalloisian, characterised by flake-tools, existed contemporaneously with the Acheulian.

**Achievement of Arms**, *THE*. *FULL*. In heraldry, a complete representation of a coat of arms. The shield is surrounded by mantling and accompanied, where the bearer is so entitled, by crest, helmet, motto, supporters, collars and badges of knighthood, and insignia of offices.

**Achilles**. Greek hero, according to legend the son of Peleus and Thetis, and a great-grandson of Zeus. As king of the Myrmidons he took part in the expedition to Troy, and in the *Iliad* Homer makes him the foremost warrior on the Greek side: his quarrel with Agamemnon is the main theme of the epic. When Achilles was an infant his mother attempted to make him immortal by dipping him in the river Styx, holding him by one heel, which remained untouched by the magical waters and therefore mortally vulnerable. This accident gave rise to the proverbial phrase by which a solitary weakness is described as the heel of Achilles.

Thetis tried to prevent his sailing to Troy by disguising him as a girl and sending him to Scyros, but

**Achromatic Lens** (Gr. *achromatos*, colourless). Optical instrument for correcting the chromatic aberration of white light. When a narrow pencil of white light, such as sunlight, is allowed to pass from one medium to another, as from air into glass, the pencil of rays is not merely bent, but is split up into light of several colours. This phenomenon is referred to as dispersion.

But the dispersive powers of different substances are not the same. We can obtain two prisms constructed of such different materials that, while the angle through which they will bend the average or mean ray of a pencil of light is the same, the amount of dispersion is different; or, on the other hand, when the deviation or bending of the mean ray is different, the amount of dispersion produced is the same. The dispersion produced by flint glass is greater than that produced by crown glass in the ratio of 61 to 43. If two prisms, one of crown glass and one of flint glass, and of suitable angles, are placed with their refracting edges turned in opposite directions—the second being upside down in relation to the first—a ray of white light passing through the first (crown glass) will be bent downwards towards the base, but the red constituent of the ray will be less bent than the violet owing to dispersion.

When these rays, however, having passed through the crown glass prism, set out on their journey through the reversed flint glass prism, the bending or deviation will be in the opposite direction; but the red ray will be less bent upwards than the violet. The difference between the deviations of the red and violet rays being, however, the same in the two prisms, the rays when they leave the second, or flint glass, prism will be parallel. Nevertheless, there will be a general deviation of the rays on the whole because the average or mean deviation in the crown prism is greater than that in the flint. Hence, by combining two prisms, one of crown glass and one of flint glass, the ratio between the refracting angles of the prism having been suitably chosen, we obtain a compound prism which deviates but does not disperse light.

This general principle is applied to construct achromatic lenses, which correct the chromatic aberration of white light when it passes through a lens, and when the curvature of the lens disperses the different coloured rays to different foci. Suppose,

for example, a parallel beam of white light impinges on a convex lens, then where the rays enter and leave the lens the violet rays will be more deviated towards the axis of the lens than the red rays, and thus will come to a focus nearer the lens than the focus of the red rays. With a concave lens the conditions are reversed. If a concave lens and a convex lens of the same material and of equal focal length were placed together, the two dispersions would counteract one another; though in this case there would be no deviation.

But by making the convex lens of crown glass and the concave lens of flint glass, we are able, as in the case of the prisms, to obtain equal and opposite dispersion and still have deviation in the direction of that produced by the crown glass. In effect the combination will be a convex lens with the chromatic aberration eliminated—in other words, an achromatic lens. By the use of two lenses it is possible to make a lens which shall be achromatic as far as the light of two colours is concerned. The combination will not be achromatic for other colours. If instead of two lenses we use three, of different dispersive materials and powers, the combination can be made achromatic for three colours, and so on. The colours for which the lens system is rendered achromatic vary with the uses to which it is put. Thus, in a telescope, achromatism is secured for rays which immediately affect the eye; in photography the lens system must be achromatised principally for the violet rays, and for rays beyond the violet which are called actinic. See Aberration; Light; Spectroscopy.

**Achromatin.** Cytological term applied by Fleming to that part of the nuclear reticulum (see Cytology) which he found to have little affinity for the usual nuclear stains, in contrast to chromatin, which stains readily with them. The term "linin" was used by Swartz with similar implication. Chromatin and achromatin may prove to be merely the same material in different states.

**Achsah.** Daughter of Caleb, friend and companion of Joshua. She was given in marriage to Othniel as a reward for his valour in taking the Canaanite city of Debir, and on her wedding day secured from her father certain springs in addition to her dowry (Josh. 15 and Judg. 1).

**Achurch, JANET** (1864-1916). British actress, whose real name was Janet Achurch Sharp. Born

Jan. 17, 1864, in Lancashire, she first played at the old Olympic Theatre, London, under Miss Genevieve Ward (1883), and later in the Benson Company. In 1889 she joined Charles Charrington, whom she married, in the pro-



Janet Achurch,  
British actress

*Donkey*

Achurch played Mrs. Linde in the revival of *A Doll's House* at the Kingsway Theatre, London. She died at Ventnor, Sept. 11, 1916.

**Acid** (Lat. *acidus*, sour). Popularly, an acid is any sour substance, but chemically acids are salts of hydrogen, as belonging to a class of substances which always contain hydrogen. Other general characteristics are that they have a sour taste, possess the property of neutralising alkalis to form well-defined salts and change the colour of blue litmus paper to red. As some salts exhibit acid properties, it is necessary to add that the substances must contain no basic elements or group of elements.

It is the presence of hydrogen that gives these compounds their peculiar acid character. Lavoisier held that oxygen is the element to which acids owe their character, but Davy showed that hydrochloric acid (HCl) does not contain oxygen, and Gay-Lussac demonstrated that hydrocyanic acid (HCN) is another acid without oxygen, so the Lavoisier theory had to be abandoned. Other elements than hydrogen are present in acids. If the acid contains oxygen, e.g. sulphuric acid (H<sub>2</sub>SO<sub>4</sub>), the abstraction of water (H<sub>2</sub>O) leaves the anhydride or acid oxide. If the acid contains no oxygen, it is indicated by the prefix *hydro*, e.g. hydrochloric acid (HCl), or hydrocyanic acid (HCN). The termination *ic* indicates that the characteristic element, or group of elements, exercises its highest valency or strength in the form of chemical energy. The termination *ous* means that the second highest valency obtains, while the prefix *hypo*, together with the termination

duction of Ibsen's plays. As Nora in *A Doll's House* she won particular distinction, and Mr. and Mrs. Charrington toured the world with this play, interpreting Ibsen for the first time in English in many lands. In 1911, Janet



efforts the study of natural science was introduced at the university. Created a baronet in 1890, he died Oct. 16, 1900.

**Acland, JOHN DYKE** (d. 1778). British soldier and politician. Eldest son of Sir Thomas Acland, he was M.P. for Callington, Cornwall, in 1774. A vigorous advocate of the war with America, he sailed in 1776 with Burgoyne's expedition. His wife is said to have gone up the river Hudson in an open boat to join him. Acland died Oct. 31, 1778, from a chill caught while fighting a duel.

**Acland, SIR RICHARD THOMAS DYKE** (b. 1906). British politician. Born Nov. 26, 1906, he succeeded his father, Sir F. D. Acland (*q.v.*), as 15th baronet in 1939. Educated at Rugby and Balliol, he became Liberal M.P. for Barnstaple in 1935. For a time during the Second Great War he served as a gunner. He founded the Forward March group in 1941, and the next year merged it with J. B. Priestley's 1941 Committee to form the Common Wealth party, which he then led until his electoral defeat in 1945. Joining the

Labour party, he was M.P. for Gravesend during 1947-55. In 1943 he transferred to the National Trust the family estates at Killerton, which lies 7½ m. N.E. of Exeter.



Sir Richard Acland,  
British politician

**Acland, SIR THOMAS DYKE** (1809-98). British politician. He was educated at Harrow and Christ Church, Oxford, and gained a fellowship of All Souls. In 1837 he became Tory M.P. for West Somersetshire, but in 1846 followed Sir Robert Peel, and finally joined the Liberal party. From 1865 to 1885 he was M.P. for North Devon. Acland helped to establish the Oxford system of local examinations. He succeeded to the baronetcy in 1871 and died May 29, 1898.

**Aclinic Line** (Gr. *a*, not: *klinein*, to bend). Line along which there is no dip of the magnetic needle. Elsewhere, owing to the magnetic attraction of the earth, freely suspended and horizontally balanced needles dip downwards at one end after having been magnetised. The aclinic line, also called the magnetic equator, makes an irregular curve roughly following the equator.



Aconcagua. The giant of the Cordillera, as seen from one of the high Andine valleys. It gives its name to one of the provinces of Chile

Lines along which the magnetic dip is everywhere the same are called isoclinic lines.

**Acne.** Chronic disease of the skin, most frequently caused by obstruction of the ducts of the sebaceous or oil glands. Several forms are recognized, the commonest being *acne vulgaris*, which appears most frequently on the face, back of the neck, back, and chest. The first sign is an eruption of small red pimples, which may suppurate, and often in the centres of these a small black point, a "blackhead" or *comedo*, the obstructed termination of the duct, may be seen. Treatment is by local applications and building up the constitution by healthy living.

**Acoemetæ** (Greek *akoimetos*, sleepless). Eastern monastic order which flourished in Constantinople in the 5th century. It was dissolved for heresy in 533. The Acoemetæ regulated their worship so that it was continuous day and night, presumably on a literal interpretation of 1 Thes. 5, 17.

**Acolyte** (Greek *akolouthos*, attendant). Name given in the Roman Catholic Church to a young cleric of the fourth minor order ranking next to a subdeacon. His office, first mentioned at Rome in the 3rd century, was that of a candle-bearer. The name is also given in the Anglican church to one who performs the same duty.

**Acoma.** Indian village in New Mexico, U.S.A. It is 80 m. W.S.W. of Albuquerque, and is supposed to be the oldest continuously inhabited place in the States. The Spaniards visited it in 1540, and later ravaged it, and about 1630 the Franciscans established a mission here. It stands on a

sandstone rock or *mesa*, at an alt. of 250 ft. above the floor of the cañon, which is here 6,040 ft. above sea level, and is approached by a winding stairway. Around it is an Indian reservation of nearly 100,000 acres.

**Aconcagua.** Lofty mountain of S. America, some 90 m. E. by N. of Valparaiso. An extinct volcano, it is in the Andes on the borders of Chile and Argentina, the summit, 23,000 ft., being in the latter country. It was first ascended in 1897 by Zurbriggen. A river of the same name rises on its S. slopes and flows 200 m. to the Pacific.

**Aconcagua.** Central prov. of Chile. Extending from the Andes to the Pacific, it is mountainous and is traversed by the Aconcagua river. The climate is hot and dry, and the soil fertile in the river valleys and where it is irrigated. Fruits, lucerne, tobacco, wine are the chief products; copper, silver, lead, iron, manganese abound. The capital is San Felipe. Area 3,939 sq. m. Pop. (1952) 128,378. Consult A. and Tierra del Fuego, W. M. Conway, 1902.

**Aconcio, GIACOMO** (1492-1566). Italian philosopher, theologian, jurist, and engineer. Having left the Church of Rome, he was banished and took refuge in England. He became a favourite of Queen Elizabeth, to whom he dedicated his *Stratagems of Satan*, written in a tolerant spirit, which made him many enemies. Philosophically, he anticipated Descartes.

**Aconite** (Lat. *aconitum*, wolf's bane). Plant better known by its common name of monkshood. In medicine the root of this plant is used for the preparation of both



12th-century Gothic cathedral, two old castles, and remains of a Roman aqueduct. The chief manufactures are silk and wine. Pop. (1951) 16,998.

**Acquiescence.** Legal term, sometimes called "sleeping on one's rights." A person who, knowing his rights, chooses for a time not to enforce them, so as to induce another to believe that he does not mean to do so, will, in a court of equity, be debarred from enforcing them.

**Acquittal.** Legal term, meaning the discharge of an accused person by order of the court after he has been properly indicted. Acquittal is a bar to any further prosecution for the same matter.

**Acre** (Gr. *agros*, field). British imperial land measure containing four roods or 4,840 sq. yds. Originally the amount of land which a yoke of oxen could plough in a day, and consequently variable, it was fixed in extent by the Weights and Measures Act, 1878. Local acres, generally smaller than the statute acre, survive in parts of Great Britain and Ireland.

**Acre** or **AQUIRY**. River of Brazil. Rising on the Bolivian frontier, it flows E. and N. to join the Purus. It gives its name to a tract of land, 59,000 sq. m. in extent, which Brazil purchased from Bolivia in 1903 for £2,000,000 and an undertaking to build the Madeira-Mamoré railway. On account of its extensive wild rubber forests, the area enjoyed a boom at the end of the 19th century. It was constituted a territory in 1943. Pop. (1950) 114,755. Its chief town is Rio Branco.

**Acre**, **St. JEAN D'**. Historic name of Ake, seaport and town of Israel. On a promontory at the base of Mt. Carmel, 80 m. N.N.W. of Jerusalem, it is connected by rly. with Haifa and Damascus. The harbour is partly sanded up, and has lost most of its trade to Haifa. Apart from ruins of the Crusaders' walls, few old buildings remain.

Of remote antiquity, the Ache of the O.T. (Judges 1), and the Ptolemais of the N.T. (Acts 21), Acre, known as the Key of Palestine, was captured by the Arabs in 638. Taken by the Crusaders under Baldwin I in 1104, it was reduced by Saladin in 1187, and recovered by Richard Coeur de Lion in 1191. Handed to the Knights of S. John in 1229, Acre was captured by the Saracens in 1291; it was the last stronghold of the Crusaders in Palestine. In 1517 the Turks captured the town from the Egyptian Mamelukes. successors of the

Saracen power. Napoleon besieged it in 1799, but his army was repulsed by the Turks, aided by a British naval force under (Sir) Sidney Smith. In 1832 the Egyptian commander Ibrahim Pasha captured it; in 1840 it was retaken by British. Austrian, and Turkish naval action and restored to Turkey in 1841.

During the First Great War Acre was occupied by British cavalry, Sept. 23, 1918. It came within the area mandated as Palestine to the U.K. by the League of Nations. In 1947 the United Nations plan for partition of Palestine between Jews and Arabs placed Acre in the Arab part of that country; when Israel was proclaimed in 1948 and was at once attacked by neighbouring Arab countries, the first Israeli success was the capture of Acre.

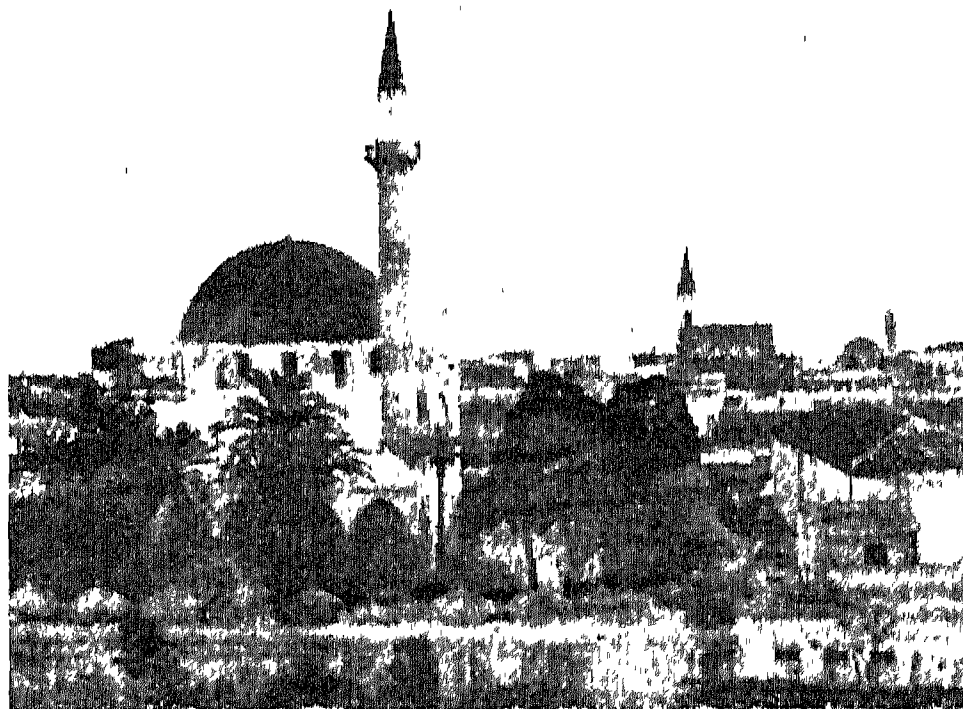
**Acridine** (Lat. *acer*, sharp). Basic substance ( $C_{12}H_9N$ ) contained in crude anthracene. From this it can be extracted as acridine chromate by adding sulphuric acid and potassium bichromate. On treating the acridine chromate with ammonia the base is obtained. The most characteristic property of acridine is that it causes sneezing when its dust or vapour is inhaled.

**Acridine.** See Flavine.

**Acrisius.** In Greek mythology, king of Argos and father of Danaë. To prevent the fulfilment of an oracle, which declared he should be slain by his grandson, Acrisius shut up Danaë in a brazen tower. There she was visited by the god Zeus in the form of a shower of gold, and had a son Perseus, who, when he grew to manhood, accidentally killed Acrisius.

**Acrobat** (Gr. *akrobatos*, walking on tiptoe). General term for a professional performer on the trapeze, a tight-rope walker, or a tumbler. Acrobatic skill is often combined with dancing, skating, equitation, juggling, or circus and pantomime clowning.

Early records of acrobatic exercise include a painting on a shard of the XIXth dynasty in Egypt of a girl turning a somersault; and the leaping on and over the backs of bulls shown in Minoan bronzes and mural paintings, a type of the



Acre. View of Ake, Israel, the historic St. Jean d'Acre prominent in Crusading times. Older towns on the site are mentioned in the Bible

bull-games still played in the south of France. Greek vase-paintings show girls somersaulting among upright swords; the Roman comic poet Terence complained that a rope-dancer drew the crowd from one of his plays.

Anglo-Saxon "gleemen" were acrobats rather than minstrels. Pictures in medieval manuscripts show the balancing tricks with which "joculators" entertained the crowd at Bartholomew Fair in London. A tumbler rode ahead of Edward II and fell off his horse so cleverly and often that the frivolous king gave him twenty shillings. A Dutchman stood on one foot on the spire of old St. Paul's church the day before the coronation of Mary I.

In the 18th century Sadler's Wells was a nursery of acrobatic talent, Richer taking precedence of all others there. Street acrobats were plentiful in Victorian days, and are still sometimes to be seen on country fair grounds. The foremost 19th-century acrobat was Charles Blondin, who several times crossed above Niagara Falls on a tight-rope. A comparable feat was recorded in July, 1948, when Sigwart Bach, a 19-year-old member of the Camilla-Meyer troupe, walked on a 490-ft. wire, stretched from the western peak of the Zugspitze in Austria to the Zugspitzhaus in Bavaria, across a ravine 9,000 feet deep.

**Acroceraunia.** Promontory of S. Albania, a projection of the Ceraunian mts., terminating in Cape Linguetta (called also Cape Glosa). It rises to 4,198 ft., and was of evil repute in classical times, especially among sailors. Horace refers to its ill-famed rocks.

**Acrogen.** Obsolete term for the higher Cryptogamia possessing apical growth.

for his eminent services as a lawyer. An ancient Hebrew poetical form of acrostic is exemplified by Ps. 119; in the original the lines of each verse begin with the same letter—in the first verse with aleph, in the second with beth, and so on through the Hebrew alphabet. A neat Greek example of the more usual form built the name of Adam from the initials of the cardinal points towards which his descendants spread:

Arktos, north,  
Dusis, west,  
Anatole, east,  
Mesembria, south.

**Acroterium.** In classic architecture, a pedestal for a statue on the apex or at one of the lower angles of a pediment (sometimes, incorrectly, the statue itself).

**Acrylic Acid.** Aliphatic organic compound,  $\text{CH}_2=\text{CH}\cdot\text{COOH}$  many esters of which are important sources of plastics. Acrylic acid can be prepared by oxidation of the corresponding aldehyde, acrolein, which can be obtained from glycerol. The esters can be prepared from the acid, or more usually by other processes. A process has been developed by which lactic acid, after acetylation and methylation, is pyrolysed to give methyl acrylate; but the main process used is that from chlorohydrin. Methacrylic acid, a related methylated acrylic acid, is also manufactured on a large scale. The importance of both these series of esters lies in the fact that they can be polymerised to give the acrylate plastics.

**Act.** In drama, that portion of a play which is performed continuously, and is followed by a brief period of rest, or entr'acte, intended to denote the passage of time. Division into acts, even into five acts, dates back to Roman times. The ancient Greek drama was not thus divided, interruptions of the action being filled in by choric passages. Modern dramatists have broken with the five-act tradition. Their plays are usually divided into three acts indicating three more or less definite stages in the story unfolded—exposition, development, climax. An act may consist of one scene, or of several scenes indicating minor changes in time or place.

**Act.** In English law, a term generally relating to something, not done in court, which has some legal effect. When a man seals a deed, he generally touches the seal and says, "I deliver this as my act and deed." See also Act of Parliament.

**Acta Diurna** (Lat., daily acts). Official bulletin issued daily in Rome from 59 B.C. until the transfer of imperial government to Constantinople, A.D. 330; it was started by order of Julius Caesar. Lettered in black on a whitened board and displayed in public, the announcements ranged through information not unlike that of The London Gazette.

**Actaeon** In Greek mythology, a famous huntsman, pupil of the centaur Cheiron. Having surprised the virgin goddess Artemis (Diana) bathing, he was changed by her into a stag, in which form he was torn to pieces by his fifty dogs on Mt. Cithaeron. Statues of Actaeon were set up as a protection against drought; the myth may represent the withering of vegetation during July and Aug.

**Acta Pilati** (Latin, acts of Pilate). Name given to the first part of the spurious Gospel of Nicodemus. Originally written in Greek, it was circulated in Latin and other languages before the invention of printing. It purports to be an official report of the trial and crucifixion of Christ, drawn up by Pontius Pilate.



Actaeon changing into a stag and attacked by his dogs  
Antique in British Museum

**Acta Sanctorum** (Lat., acts of the Saints). Collection of histories and legends of saints and martyrs projected by Heribert Roswade (d. 1629) and begun at Antwerp in 1643 by Jan van Bolland, a Jesuit. For further information, see Bollandists.

## ACTING: THE ART OF THE STAGE

Rex Walters, Professor of Speech and Drama,  
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*This subject may be studied further under such headings as Drama and Theatre, Comedy and Tragedy, and in the biographies of actors, actresses, and playwrights appearing under their respective names*

Acting is an interpretative and, at the same time, a creative art. The playwright invents and defines the character and the actor interprets his design; but the mind, personality, and physical qualities of the actor create the living vitality of the character. The actor's aim is to create perfect illusion: a state in which the audience become so engrossed in the play that, could they stop to think, they would feel that they were eavesdropping. Such a state is not easily achieved, certainly cannot be achieved without a considerable artistry on the part of the actor. This artistry is acquired by a combination of imagination, depth of emotional feeling, and technique. It is a perfect blending of these qualities that makes the great actor.

Technique is the means by which an artist expresses himself. It has sometimes been said that actors are born and not made. At the same time, considerable guidance and training are necessary before expression can be brought to

"audience-size," before the actor is able to convey the emotions of a character in such a manner that the audience will be convinced that the words of an author are the spontaneous thoughts and emotions of a person, and not of an actor portraying a person.

Both mind and body must be trained before an actor is completely equipped for his art. Mentally he must have great scope of imagination; he cannot experience all that he portrays, but he can imagine the experience of the character to such degree that they become life-like on the stage. He must observe life, know the internal make-up of mankind, and, therefore, be always inquisitive about people and about the world in general. But he must try faithfully to interpret the character drawn by the author, not to imagine one of his own. In this direction he must be selfless, and sink himself into the character. He must also, when necessary, subordinate his interpretation to a producer's conception of the character, remembering that he is only

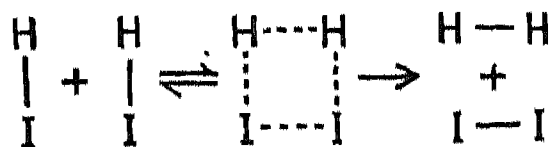




decomposition of hydrogen iodide at 180° C. and a concentration of 1 gm. molecule per litre, only about one collision in every  $10^{17}$  brings about reaction. It must be concluded therefore that reaction occurs on collision only when the colliding molecules possess between them energy greater than a certain amount. This critical amount of energy can be taken to be the activation energy for the reaction. From kinetic theory the proportion of collisions in which the molecules possess an energy greater than this minimum value  $E$ , is given by the factor  $e^{-E/RT}$ . Therefore, the rate of the chemical reaction should be given by this factor multiplied by the number of collisions.

Furthermore the calculated value of the collision number should be the same as the value of the frequency factor,  $A$ , calculated from the dependence of reaction rate on temperature. Good agreement is often found between these values; in the decomposition of hydrogen iodide, the actual number of molecules reacting per second is  $2 \times 10^{14}$  molecules per c.c., while that calculated from the activation energy and the theoretical collision number is  $3 \times 10^{14}$  molecules per c.c. In view of the approximations involved in the calculation of collision numbers, this agreement is excellent.

An alternative treatment assumes that in chemical reactions an activated complex exists as an intermediate state. This complex is considered to be in equilibrium with the reactants, and to break down to give the products. The decomposition of hydrogen iodide can be represented as :



Then the activation energy is the difference of energy between the reactants and the activated complex. By using the methods of quantum mechanics considerable progress has been made with the help of this treatment, which is sometimes called the theory of absolute reaction rates.

**Act of God.** Term used in English law to mean some act or convulsion of nature so extraordinary that it could not be foreseen; or, if foreseen, could not be guarded against. For example, an extraordinarily high tide or a tempest of rare violence. Act of God is, as a rule, a good defence to an action based on negligence.

**Act of Parliament.** Official name for a measure which, having passed through both Houses of Parliament and received the royal assent, has become the law of the land. In Rome records were usually called *acta*, and the word has been carried from there into many legislatures of the world. The laws of the U.S.A. are called Acts of Congress, and in the Canadian, Australian, and other parliaments of the British Commonwealth the word Act is used.

In the British Parliament, and in those bodies which have modelled their procedure upon it, the word bill is applied to a measure on its introduction, and for it to become an act the following stages are necessary. It is introduced into one House or the other by one of its promoters, and is read a first time, a formal proceeding only; then comes the second reading, the critical stage when the decisive vote is taken. If approved, the bill is sent either to a committee of the whole House or to a much smaller standing committee; there it is examined clause by clause and not infrequently altered. All alterations are reported to the House and, if approved the bill is read a third time. It is then sent to the other House, where the same procedure is gone through, and finally, having received the royal assent, it becomes an Act. (See Assent, Royal.)

Such is the usual procedure for public bills, and, with certain modifications, for private ones, but there are exceptions, chiefly those made by the Parliament Acts of 1911 and 1949. Money bills must originate in the House of Commons, and do not need the approval of the Lords before being presented for the royal assent. Further, any bill which, under certain conditions, has passed the Commons in two successive sessions becomes an Act on the royal assent's being received, whether the Lords will or no.

From olden times it has been the custom for all the Acts passed in a single session of Parliament to form a single statute. The Acts of each session are arranged in chapters, and officially quoted according to the year of the reign in which they were passed; for example, the Act by which King Edward VIII abdicated is cited as 1 Edward VIII, ch. 3. To obviate the inconveniences of this system each Act is given a short title by which it is usually known. The Acts of the English Parliament go back to 1235. The Acts of the

Scottish Parliament date from about 1430 to 1707.

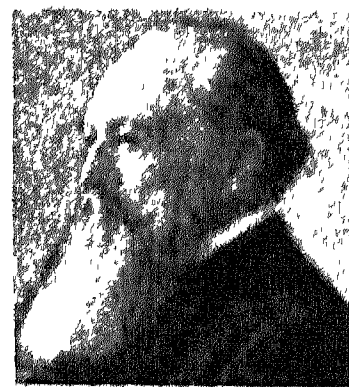
**Act of State.** Act done by a state in the exercise of its sovereign power, for example, the carrying on of a war or the annexation of territory or the making of a treaty. Such acts are considered to be outside the sphere of law. Thus, an enemy alien wounded while attempting to invade Great Britain cannot claim damages either from the Crown or from the member of the armed forces who wounded him, nor, if he is taken prisoner, can he claim release by a writ of habeas corpus. Where, however, some act done by the Crown has caused damage to a British subject, it is, with very few exceptions, no answer to his claim against the Crown servant responsible or the Crown itself that the act was an act of state.

**Acton.** Borough of Middlesex, England, 4 m. W. of London (Paddington). A residential and industrial suburb, it has engineering works, printing works, food and motor-car factories, laundries, and many other industrial works.

In 1922 important extensions were made to the local hospital as the chief part of Acton's First Great War memorial, and further extensions were made in 1928. The town hall, including an assembly hall with a seating capacity of 1,000, was completed in 1939. Under the 1948 redistribution Acton was made a bor. constituency. Among residents of note have been Richard Baxter and Henry Fielding. Pop. (1951) 67,471.

**Acton, JOHN EMERICH EDWARD DALBERG ACTON, 1ST BARON** (1834-

1902). British Roman Catholic historian and moralist usually remembered as the author of the often misquoted phrase



1st Lord Acton  
British historian

"Power tends to corrupt, absolute power corrupts absolutely."

Born Jan. 10, 1834, at Naples, Acton was the son of Sir Richard Acton, 7th bart., and grandson of Sir John Acton (c.1.). his mother belonged to a noble Rhineland family. He was educated in Paris, at Oscott R.C. college in Staffordshire, and at Munich under Döllinger, with whom he was in Italy in 1857. In 1855 he had visited the U.S.A. and in the following year he went with his stepfather Lord

obtain for all members of the profession a standard contract, to include a minimum wage and payment during rehearsals. *See* Acting; Drama; Equity.

**Bibliography.** The School of Abuse, S. Gosson, 1579; Apology for Actors, T. Heywood, 1612; Histrio-Mastix, W. Prynne, 1633; Their Majesties' Servants, J. Doran, 1865.

**Actors' Benevolent Fund.** Fund established in 1881 to provide for the systematic administration of the money annually given by actors and actresses and others for the relief of distressed members of the theatrical profession. Its offices are at Adam Street, Adelphi, London, W.C.

**Actress.** Female impersonator of women's parts in stage plays. Originally female rôles were acted by men and boys. Foreign companies which included actresses visited London early in the 17th century, and women of rank figured in Elizabethan and Jacobean court masques and pageants, but actresses, like movable scenery, were first introduced to the English stage at the Restoration, by Killigrew and Davenant, being later popularised by Betterton. Pepys saw actresses first in Jan., 1661, and noted on hearsay that one of Killigrew's productions was acted "by nothing but women." Mrs. Betterton (d. 1712) was the first notable English actress, and Edward Kynaston (d. 1706) the last celebrated English impersonator of female characters. Shakespeare has several allusions to the appearance of men and boys in women's parts, e.g. in the epilogue of *As You Like It* and in *Hamlet*, II, 2; and their rivalry enters largely into the famous stage quarrel of 1599-1601. *See* Acting; Drama.

**Acts of the Apostles.** Fifth book of the N.T., giving the earliest history of the Christian Church. The authorship was attributed by early writers to S. Luke, and this has never been seriously questioned except by F. C. Baur, whose theories are discredited. The author refers to a Gospel written by him; dedicates his work to Theophilus, to whom his Gospel was dedicated; and internal evidence shows that the Acts and the third Gospel were written by the same person. The date was probably about A.D. 65, as S. Paul's arrival in Rome is described, but his martyrdom is not recorded.

The first twelve of the chapters describe the rapid spread of Christianity after the Ascension

of Christ, and deal mainly with the Church in Palestine, with S. Peter as the dominant figure. The remainder of the work consists of a somewhat broken biography of S. Paul and an account of his missionary journeys. In many places in the second part the author writes in the first person plural, showing that he took part in the events; and this intermittent usage is quite consistent with what is known of S. Luke's life and association with S. Paul. The historical character of the Acts of the Apostles is not open to doubt. The references to it by the early Fathers are sufficient proof of its authenticity.

**Bibliography.** Of the many commentaries on the Acts, those by E. Ziller, Eng. trans. by J. Dare, 1876; R. D. Rackham, 1912; and J. A. Kindlay, 1934, may be consulted with advantage.

**Actuaries, THE INSTITUTE OF.** Founded in 1848 and incorporated in 1884, this professional body exists to protect the interests of actuaries, and to extend and improve the methods of actuarial science. Members are entitled to the letters A.I.A. or F.I.A. The headquarters are at Staple Inn Hall, Holborn, London, W.C.I. The Faculty of Actuaries in Scotland, 1856, has its h.q. at 23, St. Andrew's Square, Edinburgh.

**Actuary.** Word of Latin origin, now mainly used to describe those who work out calculations for insurance companies and similar bodies. The large insurance companies usually have special staffs of actuaries, and they are also employed by Government departments, local authorities, transport undertakings, and building societies. In Rome the *actuarius* was a man who wrote down the *acta* of the senate, and the word was first used in England for a registrar or official of that kind. In 1819 the Friendly Societies Act mentioned an actuary, and with that the present position of the profession may be said to begin. Broadly, the function of the modern actuary is the application to practical problems of the theory of probability. The actuary employed by an insurance company deals with the calculation of premiums payable under new life assurance contracts and the valuation of liabilities under existing contracts, which involves long-term forecasts of the rate of mortality. By training and experience the actuary must be well versed in statistical and financial problems.

**Acuña, CRISTÓBAL DE** (1597 c. 1676). Spanish Jesuit missionary and explorer, remembered for his *Nuevo Descubrimiento del Gran Río de las Amazonas* (new discovery of the great Amazon river) published at Madrid in 1611; a French trans. appeared in 1682; an Eng. trans. of the French in 1698. Born at Burgos, he entered a religious order at 15, and was later sent as Jesuit missionary to Chile and Peru, where at Cuenca he became rector of the missionary college. In 1639 he accompanied Pedro Texeira in his second exploration of the Amazon.

**Adab.** Ancient Sumerian city. It lay E. of Diwanîye, on the site of modern Bismaya. Excavations in 1901 revealed remains of an archaic temple. *Consult* Bismaya, The Lost City of Adab, E. J. Banks, 1912.

**Ada-Bazar** OR ADAPAZARI. Town of Turkey, 24 m. E. of Iamîd, on the river Sakaria. The see of an Armenian bishopric, it is an agricultural centre and makes agricultural implements and rolling stock. Pop. (1950) 36,210.

**Adad** OR HADAD. Storm god in ancient Semitic mythology. As Hadad, god of thunder and tempest, he was worshipped in Syria from early times, and portrayed on a bull. In Babylonia Adad was identified with Ramman, the beneficent bringer of rain; he and Shamash the sun god were the "lords of divination."

**Adalbert.** Name of two saints. One, of Northumbrian birth (d. June 25, 705), probably a grandson of Oswald, king of Deira, is reputed to have been the first archdeacon of Utrecht, and became the colleague of S. Willibrord in the conversion of the Frisians and North Germans. He built a church at Egmont, in the Netherlands, where after his canonisation an abbey was founded and dedicated to him; it was destroyed by the Spaniards in 1573.

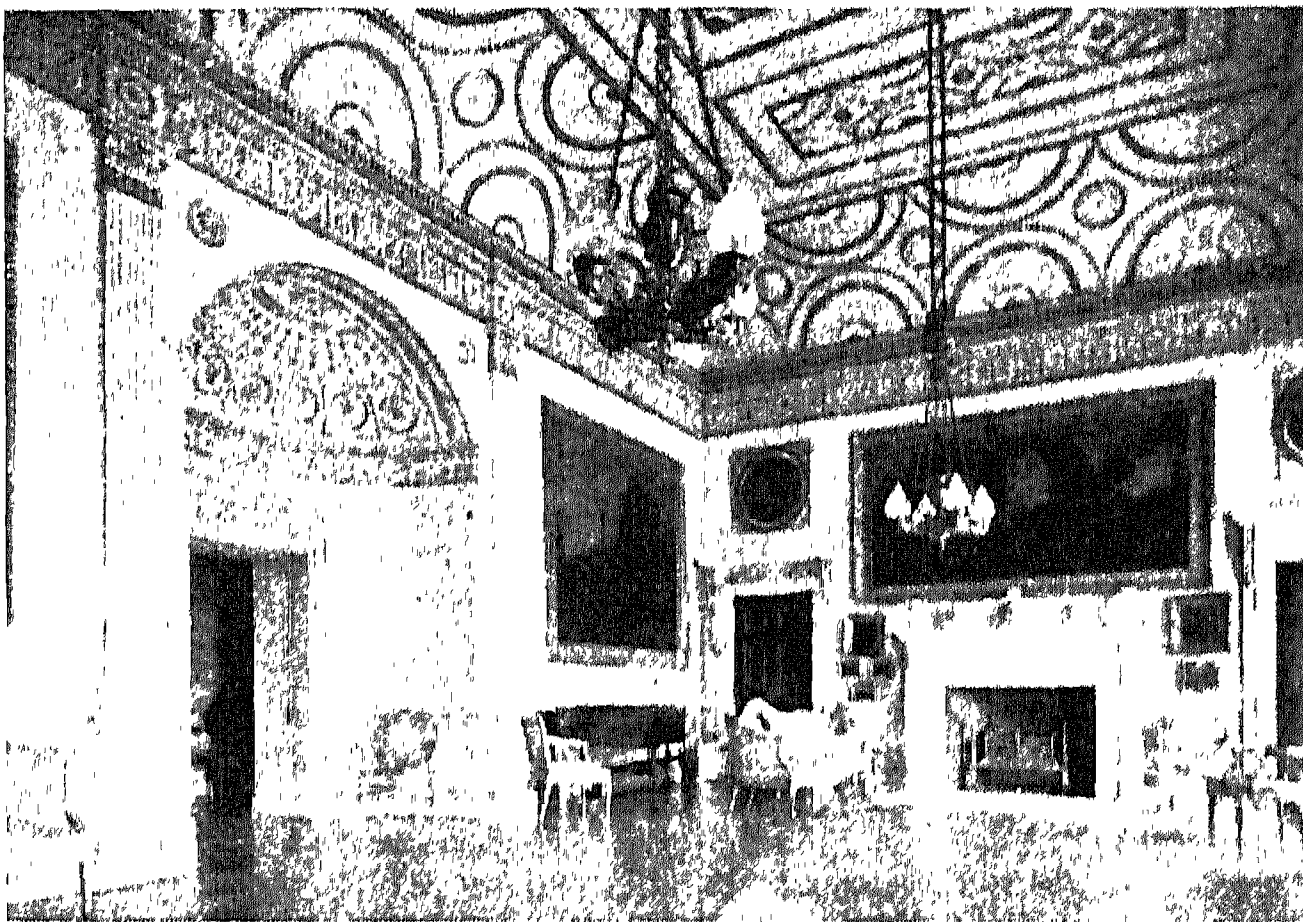
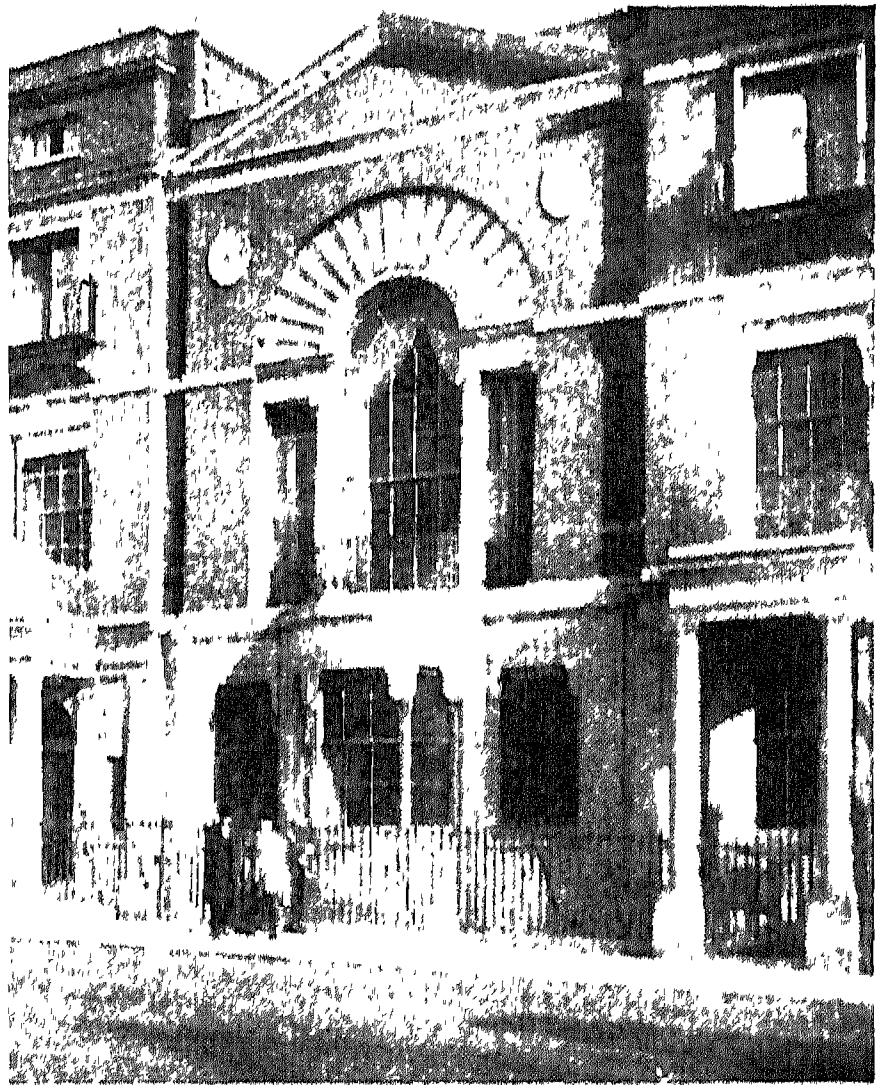
The other Adalbert (c. 936-997) was the son of a Bohemian prince; his original name was Votek or Voiciech. Born at Prague, he became bishop there in 983, and there his body was eventually buried. In 985 he baptized among other Hungarians the prince Vajk or Valk, giving him the name Stephen by which he was later called as king of Hungary and saint. Adalbert also preached Christianity to the Poles and Prussians, and April 23, 990, was murdered by the heathen in Samland, on the Baltic coast. April 23 is his feast day.

shire; and Kedleston, Derbyshire. He imparted the unity of a single imposing structure to a number of private houses grouped in a block; this system gave his town architecture great distinction, and his elegant, stucco-faced mansions in the streets of the west end of London were typical examples of his modified Greco-Roman style.

His architecture, however, was more than equalled by his achievements as a decorator of interiors. His ceilings, chimney-pieces, and staircases were designed with a lightness and grace that brought a new note into the application of classicism to domestic buildings, and has influenced interior decoration since his day. He also acquired some reputation as a landscape painter, and published with his brothers a series of engravings of their designs. He died in Albemarle Street, London,

father of the Adam brothers, was king's mason in Edinburgh, and was responsible for the design of the Royal Infirmary in that city, and of Hopetoun House. He died June 24, 1748.

**ADAM STYLE.** This is the name given to the style of furniture and household decoration first introduced by Robert Adam. It was based on recently found Greco-Roman architectural remains. Despite the introduction of arabesques, sphinxes, and griffins, extravagances were severely toned down. Prominence was given to conventionalized



Adam Style. Salon at Nostell Priory, Yorks., in a wing added by Robert Adam about 1770. The ceiling is in shades of pink, green, and cream. Top right, Boodle's Club, in St. James's Street, London. The lightness and grace so characteristic of an Adam interior are also apparent in this facade  
Photo, "Country Life"

March 3, 1792, and was buried in Westminster Abbey.

His brother James was associated in most of the work undertaken by the Adams, particularly in London, during a partnership with Robert that lasted over 25 years. His individual achievements are not known, though Portland Place, London, is said to have been designed by him. He died Oct. 20, 1794. John Adam succeeded to his father's practice as an architect in Edinburgh; William is reputed to have been a banker and an architect. Their Christian names were long perpetuated by streets in the Adelphi, London. William Adam,

floral, geometrical, and ribbon forms, often combined with the key, wave, fan, honeysuckle, and palm motifs, sometimes used as frames for medallions and panels containing figure or other paintings or designs in line relief. Such panels and medallions on walls, ceilings, and furniture were painted by Angelica Kauffmann, Zucchi, Pergolesi, and others. Colour schemes were subdued in tone, with half-tints prevailing. Furniture and fittings were designed to harmonize with the rooms, so that an Adam drawing-room is distinguishable by its unity.

In furniture, satinwood, amboyna, and various other light

woods were used in combination with mahogany. Everything was light and elegant, with a marked leaning towards straight lines. Legs of chairs and tables were tapered and usually lightly fluted. Carving was reduced to a minimum, reliance being mainly on outline and harmonizing tones. Consult *The Architecture of Robert and James Adam* (2 vols.), A. Baker, 1911.

**Adam, Juliette** (1836-1936), French authoress and publicist. Born Oct. 4, 1836, at Verberie, daughter of Dr. Lamber, she married in 1851 M. Lamaze, a lawyer, and in 1868 M. Edmond Adam, a senator (d. 1877). The leading woman writer in France for over fifty years, she founded a salon described as "the birthplace of the Republic." In 1879 she established *La Nouvelle Revue*, which she edited until 1899; under the name of Count Paul Vaulx, she also wrote many works of travel, poetry, fiction, plays, criticism, biography, and politics. She did much to promote the Franco-Russian alliance and to keep alive

the spirit of *revanche* after the defeat of 1870. She died in her hundredth year, Aug. 24, 1936. Consult *Mme. Adam, La Grande Française*, Winifred Stephens, 1917.



Juliette Adam,  
French writer



business until 1912, though also engaged in literary work. During the First Great War he served in the intelligence department and helped Col. E. M. House (*q.v.*) to prepare material for the peace conference. His books include *The Founding of New England*, 1921; *Searchlight on America*, 1930; *The Adams Family*, 1930; *The Epic of America*, 1931. He was editor-in-chief of the *Dictionary of American History*, 1941. He died May 18, 1949.

**Adams, JOHN** (1735-1826). The second president of the U.S.A. Born Oct. 30, 1735, at Braintree (later Quincy), Massachusetts, he graduated at Harvard and became a lawyer. An ardent advocate of colonial rights, he protested in 1765 against the enforcement of the Stamp Act and the right of Great Britain to tax the colonists. As a delegate from Massachusetts, he was a member of the continental congress at Philadelphia in 1776. He proposed that Washington be made commander-in-chief, was one of the committee that drafted the Declaration of Independence, and served as chairman of the board of war.

He was the chief author of the Massachusetts constitution, and one of the commissioners who negotiated peace with Great Britain, 1783. He was elected first vice-president of the United States in 1788, and re-elected in 1792. In 1796 he was elected president with Federalist support, defeating Thomas Jefferson, the Republican candidate. In 1800 the two were again candidates, and this time Adams was beaten. He retired to Quincy, where he died July 4, 1826. While in England he published his *Defence of the Constitution of the United States*, 1787. *Consult* Lives, C. F. Adams, 1871; J. T. Morse, 1890; *The Adams Family*, J. T. Adams, 1930; *Honest John Adams*, G. Chinard, 1933.

**Adams, JOHN**. Name by which Alexander Smith (c. 1760-1829), English seaman and mutineer, is better known. Under the lead of Fletcher Christian he took part in the mutiny in H.M.S. *Bounty*, April, 1789. Of the nine members of the crew who left Tahiti and, with Tahitian wives, settled on

Pitcairn Island, he was in 1808 the sole survivor, being at that time head of a prosperous little colony. Unmolested by the authorities, he died in 1829. *See* *Bounty*, *Mutiny of the*.

**Adams, JOHN COUCH** (1819-92). British astronomer, famous for having predicted the existence of the planet Neptune. He was born at Lancaut, near Launceston, Cornwall, June 5, 1819. While working for the Cambridge tripos in 1841, he was struck by the unaccountable anomalies in the motions of Uranus. After graduating as senior wrangler in 1843, he devoted himself to the study of these anomalies, working from the hypothesis that they were derived from a more distant and hitherto unknown planet. By Oct., 1845, he had approximately solved the inverse problem of perturbation on which he had been engaged, and submitted the result of his work to the Astronomer Royal.

Owing to delays in investigation at Greenwich and Cambridge, the credit of priority passed to the French astronomer, Leverrier, who had been engaged upon the same problems and worked out a hypothetical orbit for the disturbing planet. Leverrier's work was completed in the following June, and the planet was found by the German astronomer Galle on Sept. 23, 1846, very near the place assigned to it by Leverrier. It was observed at Cambridge six days later. Adams's name is also associated with investigations into the periodic reappearances of the Leonids, and the determination of 33½ years as their cycle. Professor of astronomy at Cambridge from 1858, he was director of the observatory there from 1860 until his death, Jan. 21, 1892.

**Adams, JOHN QUINCY** (1767-1848). Sixth president of U.S.A. The son of John Adams, the second



John Quincy Adams,  
President of the  
U.S.A.

president, he was born July 11, 1767, at Quincy, Massachusetts. After studying at Paris, Leyden, and Amsterdam he served as secretary to his father, went to the bar, and was minister to the Netherlands under Washington and to Prussia under his father. Elected to the senate from Massachusetts in 1803, he resigned in 1808, following on a dispute with

the dominant Federalist party over American relations with Great Britain, in which quarrel Adams was for firm measures. After a short term as professor of rhetoric at Harvard, he became minister to Russia. He was chairman of the American commission that negotiated the peace of Ghent, 1814; served during 1815-17 as minister to Great Britain; and, as secretary of state under President Monroe, was chiefly responsible for the "Monroe Doctrine." In the presidential election of 1824, he was chosen president by the house of representatives as no candidate had received a majority of the electoral votes. Andrew Jackson defeated him in 1828. Adams entered the house of representatives in 1831, where he became known as a courageous opponent of the "slave power" and defended the right to petition against slavery. He died in the Capitol on Feb. 23, 1848. *Consult* Lives, J. T. Morse, 1890; B. C. Clark, 1932.

**Adams, MAUDE KLEKAUDEN** (1872-1953). American actress. Born at Salt Lake City Nov. 11, 1872, she made her theatrical debut in children's parts. She played with John Drew in *The Lost Paradise*, 1892; then under the management of E. H. Sothern



Maude Adams,  
American actress

and Charles Frohman, making a hit in 1892 in *The Masked Ball*. This was followed by a series of successes in plays by J. M. Barrie, especially as *Habbie* in *The Little Minister*, 1898; *Miss Phoebe* in *Quality Street*, 1902; *Peter Pan*, 1905; *Juliet*, 1899, and *Rosalind* in *As You Like It*, 1910, were among her notable Shakespearean parts. Retiring in 1918, she made two later appearances in 1931 and 1934. She died at Parnersville, N.Y., July 17, 1953.

**Adams, SARAH FLOWER** (1805-48). English Unitarian poet and writer of hymns, of which the best known is *Nearer my God, to Thee*. Born at Great Harlow, Essex, Feb. 22, 1805, daughter of Benjamin Flower, a political writer of radical views, she married William Bridges Adams, an inventor of some importance in the early days of railways. She died Aug. 14, 1848.

**Adams, THOMAS**. English divine. A preacher of great eloquence, he flourished between 1612

**Adar.** Twelfth month of the sacred, and 6th month of the civil, year of the Jews, corresponding to Feb.-March. The fast of Esther is observed on the 11th, and the feast of Purim or Lots on the 14th.

**Adcock,** ARTHUR ST. JOHN (1864-1930). British author and journalist. Born in London, Jan. 17, 1864, and well known as acting editor of *The Bookman*, he wrote more than 30 volumes of verse, fiction, essays, and London literary topography. He died June 9, 1930.

**Adda.** River of Italy, the ancient Addua. Length about 180 m. It rises in the Rhaetian Alps, flows S.W. through the Val Tellina, between the Rhaetian and Bergamasque Alps, and forms the lake of Como. Issuing thence, it traverses Lombardy and joins the Po 8 m. above Cremona.

**Addams,** JANE (1860-1935). American sociologist. Born in Cedarville, Illinois, Sept. 6, 1860, the daughter of a Quaker friend of Abraham Lincoln, she was educated at Rockford College, Illinois, and spent two years in Europe, in the course of which she studied conditions of poverty in the east end of London. On her return to the States she became a worker among the poor. In 1889, with Ellen Gates Starr, she helped to found Hull House, a social settlement in Chicago, on the lines of Toynbee Hall, London, and acted as its head resident. She was an ardent feminist and worker for international peace. In 1931 she shared the Nobel peace prize with Dr. N. M. Butler. Her books include *Democracy and Social Ethics*,



Jane Addams,  
U.S. sociologist

Consult *Life*, J. W. Linn, 1935.

**Addax** (*Addax nasomaculatus*). Species of African antelope related to the gemsbok. It has fine ringed horns, sometimes nearly a yard long, which twist in an open spiral in both sexes. Found in N. Africa and Arabia, and an animal of the desert, it is a little over 3 ft. in height, has a tuft of hair on the forehead, and develops a fine mane in winter.

**Addenbrooke,** JOHN (1680-1719). English physician. He was born at Swinford Regis in Staf-

fordshire, and educated at Catharine Hall, Cambridge. The extent of his medical practice is unrecorded, but at his death he left the sum of £4,000 for the founding of "a small physical hospital" in Cambridge. Addenbrooke's Hospital has long been an important adjunct of the medical school of Cambridge, besides being of direct service to the town and neighbourhood. An essay on Freethinking, written by Addenbrooke, was published in 1714.

**Adder** or **Viper** (*Vipera berus*). Venomous snake, the only one in Great Britain. The word is really nadder, a nadder being corrupted



Adder. Close view of a large specimen of Britain's one venomous snake

into an adder, as a napron into an apron. It is found in every county in England, Scotland, and Wales, in varying numbers, but, like other snakes, is absent from Ireland. It is the only snake known in Scotland, with the exception of one or two examples of the ring snake in Roxburgh. It is common in some parts of Wales, in S. England, and the N. of Scotland.

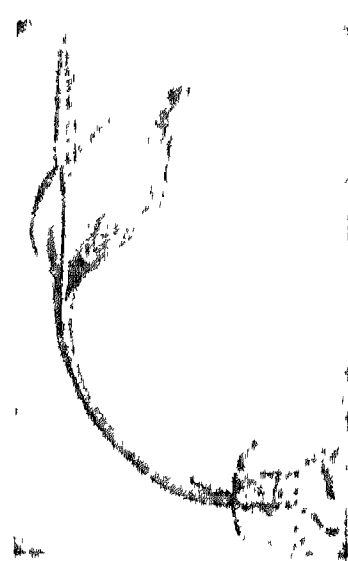
The average size of adult vipers in Great Britain is from 20 ins. to 25 ins. A smaller variety, known as the small red viper, averages from 10 ins. to 12 ins. in length. The adder is distinguished by its flattened head, upon which are two dark bands converging in the form of a V. Along the back there is a dark zig-zag line, and along the sides are two rows of dark patches, one on each side. Its food consists of mice, slow-worms or other lizards, young birds, newts, and water-voles.

The females are slightly larger than the males as a rule, less brilliantly coloured, and can be distinguished by their shorter tail, which is much more obviously an appendage than in the male. The upper jaw carries the poison

fangs, about  $\frac{1}{2}$  in. in length, pointing backwards into the throat. Their mechanism is that of other members of the same family of serpents. The reproduction is viviparous, the young being born alive, usually ten to thirteen.

The bite of the adder is rarely fatal, except in the cases of young children and persons in ill health. The most important consideration is to prevent the poison from getting into the system. This may be done by instantly ligaturing the affected part, by the tight tying of a piece of string, or by compressing the veins forcibly. The wound should then be strongly sucked until it bleeds profusely. This is quite safe, provided that the lips or tongue are not cracked or sore. Strong ammonia and caustics should be applied to the seat of the injury, or it may be burnt with a red hot coal. Slightly cutting the place with the point of a pen-knife will assist bleeding. The patient must be kept cheerful. In all cases medical assistance should be obtained at once.

**Adder's Tongue Fern** (*Ophioglossum vulgatum*). This British fern lacks the typical frond. Each year a single leaf is produced which is divided into



Adder's Tongue,  
a pasture fern

two parts: a smooth, leathery, oval blade, 3 ins. or 4 ins. long, and an erect, unbranched spike bearing a double row of capsules which contain the spores. It is much more plentiful than is commonly supposed,

growing inconspicuously among grass in damp pastures.

**Adding Machine.** Name for machine used in mechanical accounting in offices and banks. See *Calculating Machines*.

**Addington.** Former village of Surrey, part of the county borough of Croydon. Here is Addington palace, built in 1772, used as a residence by the archbishops of Canterbury during 1807-1808. Remodelled by Norman Shaw, R.A., after being a country club it housed the royal school of church music. Part of the 1,200-acre estate was developed for housing. Another Addington is in Kent, 7 m. from Maidstone; in the park are Celtic remains.

re-entered the town in state on May 5, the fifth anniversary of its fall. Pop. (est). 350,000. *See* Abyssinia; East African Campaign; Haile Selassie.

**Addiscombe.** Eccles. district of Surrey, England. It is a residential suburb of Croydon. During 1812-58 the East India Company had a college here for instruction in preparation for the scientific branches of the Indian Army.

**Addison, CHRISTOPHER ADDISON, 1ST VISCOUNT (1869-51).** British physician and politician. Born at Hogsthorpe, Lincolnshire, June 19, 1869, he was educated at Harrogate and St. Bartholomew's hospital, London. He was for a time editor of *The Quarterly Medical Journal*. He entered parliament as Liberal M.P. for Hoxton in 1910, and was appointed parliamentary secretary to the board of Education in 1914, minister of munitions in 1916, and head of a new ministry of reconstruction in 1917. Transferred to the local government board in 1919, he became the first minister of Health that year. This post he resigned in 1921 after his housing scheme had been widely criticised, and became minister without portfolio until he lost his seat in the 1922 election. Joining the Labour party, he was M.P. for Swindon, 1929-31 and 1934-35, serving as minister of Agriculture, 1930-31. Created baron 1937, viscount 1945, and K.G. 1946, he was leader of the house of lords during 1945-51, Dominion Affairs (later Commonwealth Relations) secretary, 1945-47, lord privy seal in 1947, paymaster-general 1948-49. He died Dec. 11, 1951.

**Addison, JOSEPH (1672-1719).** English essayist, poet, and statesman. Son of Lancelot Addison, who became dean of Lichfield, he was born May 1, 1672, at Milston rectory, near Amesbury, Wiltshire. He went to schools at Amesbury and Lichfield; to the Charterhouse, where his friendship with Steele began, and in 1687 to Oxford, first to Queen's, and then to Magdalen, where he won distinction as a writer of Latin verse, graduated M.A. in 1693, and became a fellow of Magdalen in 1698. The elm-bordered walk by the Cherwell is named Addison's Walk. His earlier efforts in verse included commendatory lines to Dryden, a translation of the Fourth Georgic of Virgil, and a versified Account of the Greatest English Poets.

Through Dryden Addison was introduced to Congreve and Jacob

Tonson, the publisher; and through Congreve to the Whig statesman, Charles Montague, afterwards Lord Halifax, who induced him to abandon the idea of taking orders, and secured for



*Joseph Addison*

*Painting by Kraemer*

him a state pension in order that he might qualify by travel for political service. There was at the time keen rivalry between Tories and Whigs to secure young recruits of talent and promise. Leaving England in 1699, Addison spent nearly four years in France, Italy, Austria, Switzerland, Holland, and Germany. In Paris he met Boileau and Malebranche; at a carnival in Venice he saw a crude play on the subject of Cato, which suggested his own play.

When he returned to England at the close of 1703 in straitened circumstances, Tonson introduced him to the Whig coterie known as the Kit-Cat Club, and through Halifax he was commissioned to write a poem in celebration of the victory of Blenheim. This poem, *The Campaign*, 1704, secured for him the succession to John Locke as a commissioner of excise and an under-secretaryship of state. In 1705 he went with Halifax to Hanover. In the same year he published his *Remarks on Several Parts of Italy*. His *Fair Rosamond*, an unsuccessful opera, followed in 1706, and in 1708 he was returned M.P. for Lostwithiel, an election later declared invalid. In 1708 he went as chief secretary to Ireland, where he made many friends, including Swift, and sat in the Irish Parliament as member for Cavan. In 1710 he became M.P. for Malmesbury.

Collaboration with Steele on *The Tatler* led to the foundation by them of *The Spectator*, 1711-14, on his essays in which, and especially his portrait of Sir Roger de Coverley, his literary

fame mainly depends, though his papers in *The Guardian*, *Freeholder*, and *Old Whig* are also noteworthy. His *Cato: a Tragedy*, proved for political reasons a great success in 1713, and in 1714, on Anne's death, he became secretary to the regency. In 1715 he was again in Ireland as chief secretary, and in 1716 was appointed a commissioner for trade and colonies. On Aug. 3, 1716, he married Charlotte countess of Warwick, whose neighbour he was when he occupied Nell Gwyn's old house at Chelsea. From April, 1717, to March, 1718, he was a secretary of state, and he died of asthma and dropy at Holland House, June 17, 1719, leaving by his marriage with the countess of Warwick (d. 1731) a daughter, Charlotte, who died unmarried in 1797. His last words, addressed to his stepson, were: "See in what peace a Christian can die." He was buried in Westminster Abbey, where a monument to him was erected in 1809.

Politically Addison's integrity was without stain, his temper ever equable; his principles were unchanging. He was popular alike with statesmen and habitués of coffee-house and club. As a writer he helped to found modern English prose and establish a public opinion, while the continuity of his personal studies in *The Spectator* foreshadowed the English novel. Gifted with wit, satire, and insight, he laughed vice out of court and made open violation of decency once for all the mark of a fool. His friendships were many. He had one serious quarrel, fastened upon him by Pope, and a regrettable political difference with Steele, but in neither case did he allow vexation to rob him of good temper. Pope's lines on *Atticus*, the attack on *Cato* by John Dennis, and Bernard Mandeville's phrase, "a parson in a tie wig," were the severest things said of him by contemporaries. His religious sincerity is shown in several hymns, including "When all Thy mercies, O my God."

*Bibliography.* Works, Edin., 6 vols., 1856; Johnson, *Lives of the Poets*; Macaulay, *Essays*; Thackeray's *English Humourists of the Eighteenth Century*; Taves, W. J. Courthope, 1884; P. Southern, 1954.

**Addison's Disease.** Constitutional disease associated with changes in the suprarenal capsules or small glands attached to the kidneys. The most frequent cause is tuberculosis of these glands. The disease begins with symptoms of weakness and





Adelaide. King William Street, the fine thoroughfare which runs through the centre of the city from S. Peter's Cathedral to South Terrace

after a week or more of discussion, the Address is voted, it is taken to the sovereign, who returns thanks to the Lords by the Lord Steward, and to the Commons by the Comptroller of the Household. The two Houses also address the sovereign on occasions of special joy or sorrow, such as a birth or death in the royal circle, an escape from death, or a recovery from illness.

This privilege of addressing the sovereign goes back to the origin of Parliament under Henry III and Edward I, and was for long used in a less formal manner than is the case to-day. In the reign of Elizabeth, for instance, Parliament addressed her, urging her marriage and a settlement of the succession; the Petition of Right was an address to Charles I, and George III was the recipient of others. As, however, power passed from the king to his ministers, this method of drawing attention to grievances became less necessary. See Parliament; King's Speech.

**Adelaer** OR KURT SIVERTSEN (1622-75). Scandinavian seaman, Norwegian by birth, Sivertsen became a sailor, first in the Dutch navy and then in that of Venice, for whom he fought with distinction against the Turks. In 1654, with a single vessel, he seriously damaged the Turkish fleet in the Dardanelles, and compelled the Turks to surrender at Tenedos. In 1662 he took command of the Danish fleet, retaining this post until his death, Nov. 5, 1675. His name of Adelaer, or the eagle, was given him by the Danes.

**Adelaide.** Capital of South Australia. It stands near St. Vincent Gulf, 7 m. by rly. S.E. of Port Adelaide. The city, founded in 1836, and named after the queen of William IV, is divided into North and South Adelaide,

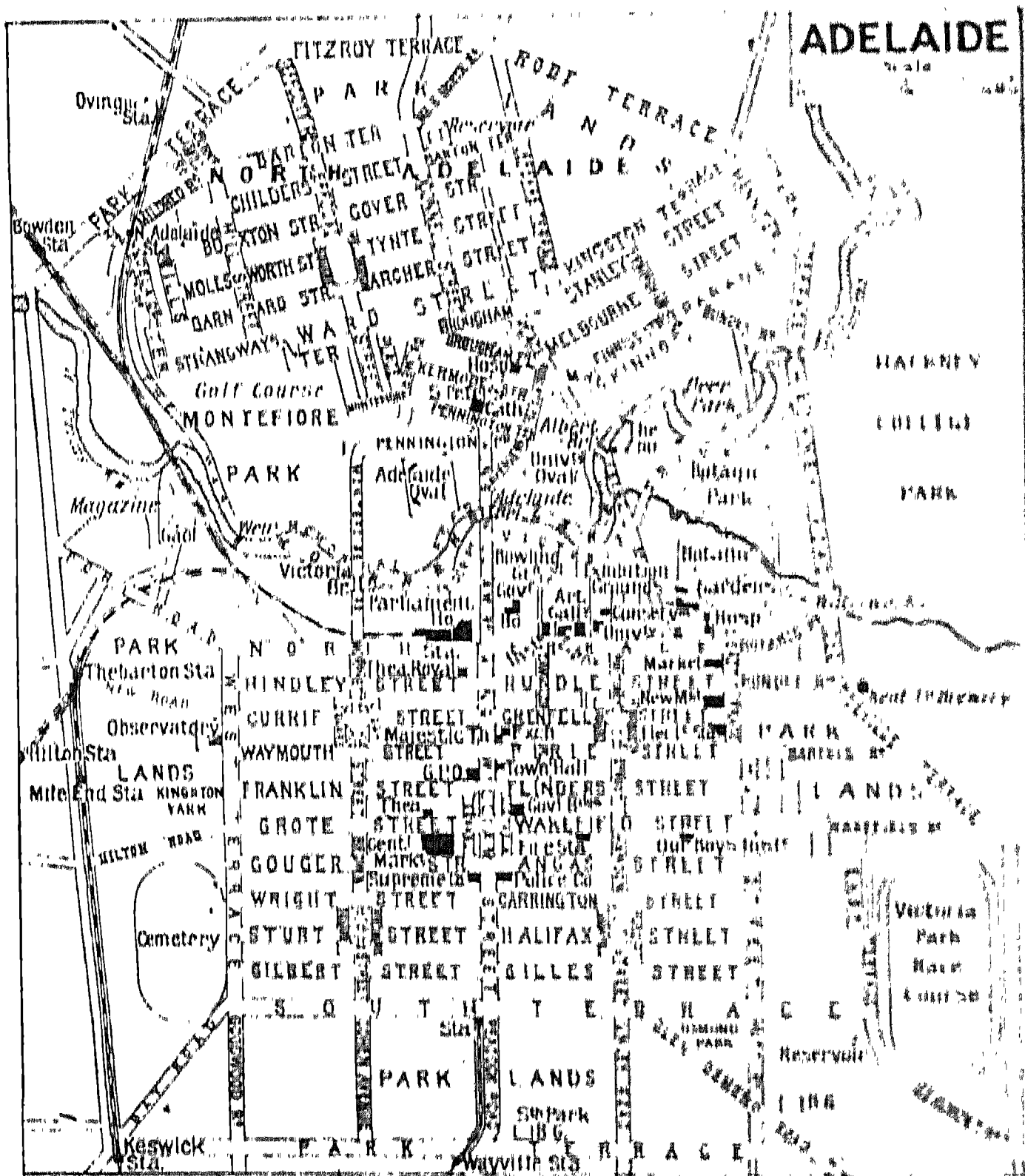
the latter being the commercial portion, by the Torrens river. An important station on the Australian railway system, it is situated on a plain, overlooked on the E. and S. by the Mount Lofty range, which rises between 4 m. and 8 m. beyond the town. The Torrens, crossed here by four bridges, has been converted by a dam into an extensive lake.

On the wide, regular streets,

laid out in a "grid" formation, stand many imposing buildings—the government house, parliament house, town hall, South Australian institute, jubilee exhibition building (1887), and hospital.

Adelaide is the seat of an Anglican and a Roman Catholic bishopric, with cathedrals dedicated respectively to S. Peter and S. Francis Xavier, its chief educational institutions being the university and a school of mines and industries. A number of fine statues includes one of Robert Burns and copies of Canova's Venus and the Farnese Hercules. The Botanic Gardens have an area of 40 acres, and the adjoining Botanic Park and Zoological Gardens are 80 acres in extent.

There are also extensive parks and parklands on the outskirts, forming a green belt one mile broad, the suburbs being built on the far side. At Marble Hill, 12 m. distant, in the Mount Lofty range, is the vice-regal summer residence. Adelaide, which claims to be free of slums, is the



Adelaide. Ground plan of the Queen City of South Australia, which is celebrated for its magnificent situation and its broad and regularly laid-out streets

was a popular Adelphi hero. The theatre was built as the Sans Pareil in 1806 by the inventor of "Old True Blue" washing blue, John Scott, who with his daughter was indefatigable in working for its success. Renamed the Adelphi in 1819, it was rebuilt in 1858, 1901 (when for a few months it was called the Century), and 1930.

**Aden.** British colony and protectorate on the southern coast of Arabia. Though under the same governor, each is separately administered. Aden colony is about 100 m. E. of the Straits of Babel-Mandeb and comprises the Aden and Little Aden Peninsulas, a 16-m. long strip of territory enclosing the harbour which lies between them, and the island of Perim at the entrance to the Red Sea. On the E. side of the Aden Peninsula, a rocky volcanic mass 5 m. wide, is Aden town (the Crater); on the W. is the harbour suburb of Tawahi. The Peninsula is joined to the mainland by the flat, sandy isthmus of Khor Maksar. On the Little Aden Peninsula, W. of the harbour, is the £45,000,000 oil refinery and township begun in 1952, opened 1954.

The colony is highly important as a strategically placed refuelling station for ships: about 4,600 vessels enter the port annually. There are an R.A.F. aerodrome, a civil airport served by several international air lines, an overseas radio-telephone service, and a cable station. Internal land communication is by road only. The climate is hot but healthy; water is obtained from bore-wells at Sheikh Othman on the mainland. The colony is a distributing centre for trade between Arabia

and the E. African coast, exports including hides, skins, coffee, incense, and gum. Its main industries are the bunkering of ships, handling of cargo, and fishing; there are also salt works. The Little Aden refinery, with a capacity of 5,000,000 tons a year, started production in 1954; it refines oil from the Middle East for E. Africa, India, Pakistan, and Ceylon, and for bunkering ships.

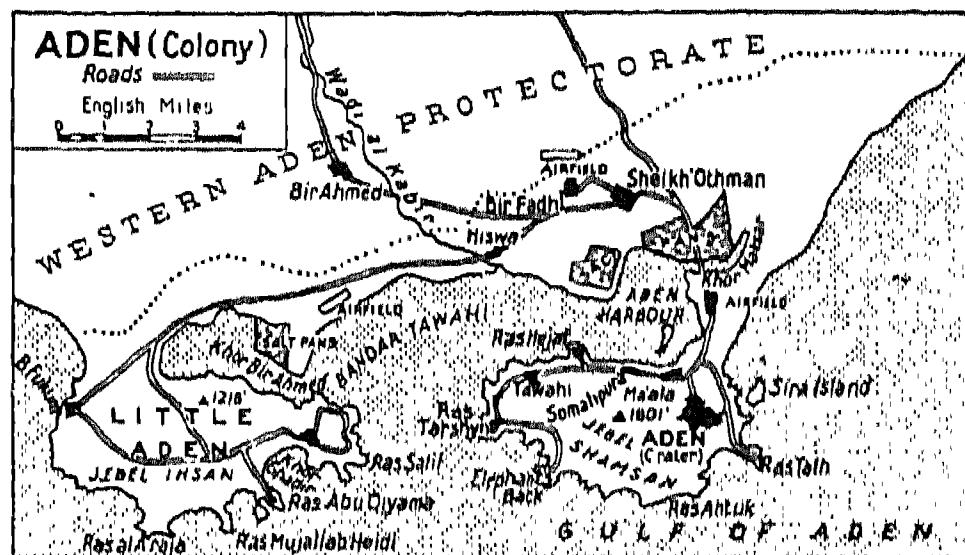
Formerly controlled by the govt. of India, Aden was constituted a Crown colony in 1937. Administration is through an executive and a legislative council, and includes that of Kamaran, an island 200 m. N. of Perim: the free port of Aden is adminis-

tered by a board of trustees. There are 2 govt. colleges, some 50 schools, and a civil hospital. Pop. (est.) 130,000.

Aden protectorate (*see* map of Arabia) has a coastline running from Husn Murad (opp. Perim) 740 m. E. to the frontier of the sultanate of Muscat and Oman, and is bounded on the N.W. by the kingdom of the Yemen and on the N.E. by the Ruba' al Khali (empty quarter). Area 112,000 sq. m. It is divided into

the Western Protectorate which rises from a coastal strip to low ranges with plains and a 6,000-ft. plateau beyond, and the Eastern Protectorate which is mainly desert and bare mountains and includes the Hadhramaut; chief towns are Lahej, 18 m. N.W. of Aden, in the W., and Mukalla in the E. The island of Socotra forms part of the protectorate. Land communication is chiefly by camel caravan, though the use of motor vehicles is increasing. A regular air service links the colony and the protectorates. Crop cultivation (chiefly sorghum and date palms) is possible only by irrigation; tobacco, dates, and dried fish are exported.

The constituent states of the Western and Eastern Protectorates are administered by their sultans and sheikhs who are in treaty relations with Great Britain and are advised by a British agent representing the governor. Most of the treaty chiefs of the



Western Protectorate belong to a federation formed in 1954 to deal with matters of common interest. Pop. (est.) 650,000.

Part of Arabia Felix, Aden was of considerable importance in Roman times. Unsuccessfully occupied by the Portuguese in 1513, it fell to the Turks in 1538, was seized in 1735 by the sultan of Lahej, and was the object of many struggles until 1839 when it was annexed by Great Britain. Perim was occupied by the British in 1857. Socotra became a protectorate in 1886. Aden was the base for the British campaign in East Africa, 1940-41.

**Aden, GULF OF.** Arm of the Arabian Sea, between Arabia and Somaliland in Africa. Its length is about 500 m. and its greatest breadth about 200 m. It is connected with the Red Sea by the Straits of Babel-Mandeb.

**Adenauer, KONRAD** (b. 1876). German politician. Born at Cologne, Jan. 5, 1876, Adenauer was lord mayor of his native city 1917-33 and president of the Prussian state council. Dismissed and subsequently



Aden. The free port of this British colony on the S. coast of Arabia. Some 4,600 vessels enter it every year, many of them to refuel



**Adirondacks.** Group of mts. in the N.E. of New York state, U.S.A. Lying between Lake Champlain, E., and the St. Lawrence, W., the group, in which rise the head streams of the Hudson, is the northern end of the Appalachian system. Numerous small lakes, many of them more than 1,500 ft. above sea level, afford excellent fishing; there is a state forest reserve covering 4,000 sq. m. The region, especially Keene Valley, is a favourite hunting and tourist resort, and contains rich deposits of magnetic iron-ore. The highest summit is Mt. Marcy or Tahawus, 5,345 ft.

**Adit** (Lat. *aditus*, entrance). Opening driven into a mine laterally, not, like a shaft, vertically. Adits are generally driven on a slight up-gradient to allow of a ready flow of water, their principal purpose being for drainage; they are also used for ventilation. Ancient mining was carried out by adits, probably the oldest method. Both coal and lead were mined in this way.

**Adjective.** Grammatical name for word used to express a quality of a noun, or to restrict or enlarge the meaning and application of the noun. In English, nouns are often used as adjectives and adjectives as nouns. In some languages the adjective usually precedes its noun, in others it usually follows.

**Adjournment.** Literally, a postponement to another day. The word is chiefly used in connexion with debates in parliament, sittings of the Courts, and meetings of other public bodies. When the meeting of a body is adjourned, the business before the meeting at the time of the adjournment may be dealt with at the next sitting.

In the house of commons a member who moves the adjournment of the house has, by courtesy, the right of opening the debate when resumed.

**Adjudication.** The order of the court in bankruptcy by which a debtor is made bankrupt and his property given to a trustee for the benefit of his creditors.

**Adjutant** (Lat. *adjutare*, to assist). In the British army, a regimental staff officer. The appointment is almost always held by a captain, but occasionally by a senior lieutenant who may be

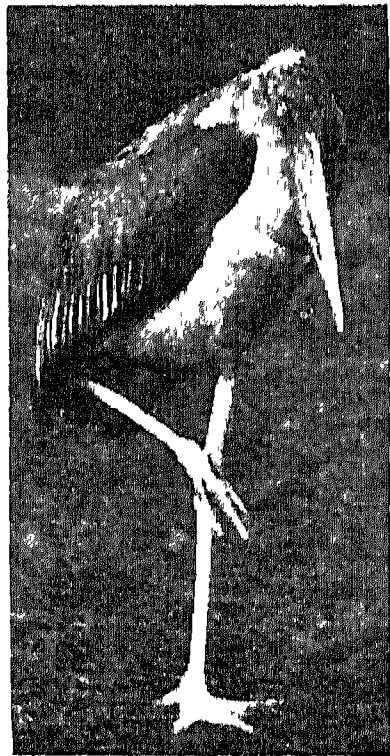
promoted to captain on appointment. An adjutant is appointed for three, or very occasionally six, years, and receives additional pay. The C.O. may appoint a lieutenant as assistant-adjutant to assist the adjutant in training duties.

The adjutant receives and issues orders on behalf of the commanding officer of a garrison, regiment, battalion, or training unit; directs the training of recruits; superintends the work of the orderly room and general administration of the unit; and is responsible for the upkeep of the regimental books and records. Regimental officers wishing to communicate with the commanding officer do so through the adjutant. In peace time officers of the regular army are appointed as adjutants of all auxiliary forces.

In the Royal Air Force there are station and squadron adjutants; a station adjutant is normally a squadron-leader, a squadron adjutant is a pilot officer or flying officer.

In a number of foreign armies an adjutant is the equivalent of a British aide-de-camp, while adjutant-general is the equivalent of an aide-de-camp to a royal personage. In the French army the work of an adjutant (*adjutant*) is equivalent to that of a British company-sergeant-major, the work of an adjutant-major to that of a regimental sergeant-major. In the U.S. army the adjutant is concerned solely with personnel matters; the officer corresponding most nearly to the adjutant of a British unit is the executive officer.

**Adjutant** (*Leptopilus dubius*). Indian stork of the genus which includes the marabou stork of Africa. It is a large bird, standing nearly 5 ft. high, and



Adjutant, a bird of the stork family

the extended wings often measure 15 ft. from tip to tip. Hanging on its breast it has a pouch which is connected with the respiratory system. This, together with its bald head, gives it a somewhat repulsive appearance. A useful scavenger, it is protected in India.

**Adjutant-General** TO THE FORCES. Military member of the British Army Council responsible for recruiting, medical services, education, welfare, prisoners of war, and the registration of graves. Questions of military discipline are referred to

him, and he issues orders when the military is needed to aid the civil power. He regulates the flow of drafts to units abroad, and the discharge of time-expired men. In war an adjutant-general is appointed to the staff of a commander-in-chief, and deputy adjutant-generals, assistant adjutant-generals, and deputy assistant adjutant-generals (D.A.A.G.) to the staffs of commanders of corps and divisions.

**Adler, ALFRED** (1870-1937). Austrian psychologist. Born in Vienna Feb. 7, 1870, he practised there as a physician during 1897-1927, when he was appointed lecturer in psychology at Columbia University, U.S.A. In 1932 he became professor of medical psychology at Long Island college of medicine. He died suddenly in Aberdeen May 27, 1937.



Alfred Adler. Austrian psychologist

He was an early colleague of Freud, from whom he later differed, thinking that Freud stressed sexual motives too much in human behaviour rather than man's striving for superiority and power. Adler founded the school of individual psychology. His most important book was *The Practice and Theory of Individual Psychology*, 1929. (Consult A B C of Adler's Psychology, P. Mairet, 1928; A.A., P. Bottome, 1946.)

**Adler, FRIEDRICH WOLFGANG** (b. 1879). Austrian socialist. Born July 9, 1879, Fritz Adler was educated in Vienna and at the university of Zürich. Secretary of the Social-Democratic party of Austria, 1911-25, on Oct. 21, 1916, he shot dead in a café the Austrian prime minister, Stürgkh. He was sentenced to death in May, 1917, but the sentence was commuted to 18 years' imprisonment. A petition from the minister of justice to the emperor Charles brought a full pardon on Nov. 1, 1918.

Adler was a member of parliament, 1919-25. He was elected secretary of the Labour and Socialist International on its foundation at Hamburg in May, 1923; he served at its headquarters, first in London, then Zürich, and later Brussels until 1940, when he went to the U.S.A. He returned to Zürich in 1946.

His father, Victor Adler (1852-1918), founded the Austrian Social



disputes, in which it may be necessary to weigh the rights of the individual against the benefit to the community. Moderate opinion recognizes that much delegated legislation by ministries is unavoidable, but would severely limit sub-delegated legislation.

**Administrator.** In English law, the person to whom are granted letters of administration to wind up the estate of a deceased person. See Administration, Letters of.

**Admiral** (Arab. *amir-al-bahr*, commander of the sea). Title borne by naval officers of high

flag at sea he is retired when his turn comes. Vice-admirals are employed in command of important naval bases, battle squadrons and the larger fleets abroad, and must retire at 65 or on completing three years from their last service.

The rank of admiral, also awarded by selection, is the highest in which naval officers are usually employed, and all the principal commands, both afloat and ashore, are generally held by admirals. The age limit is 65, and retirement is enforced after three years' unemployment, or immediately on

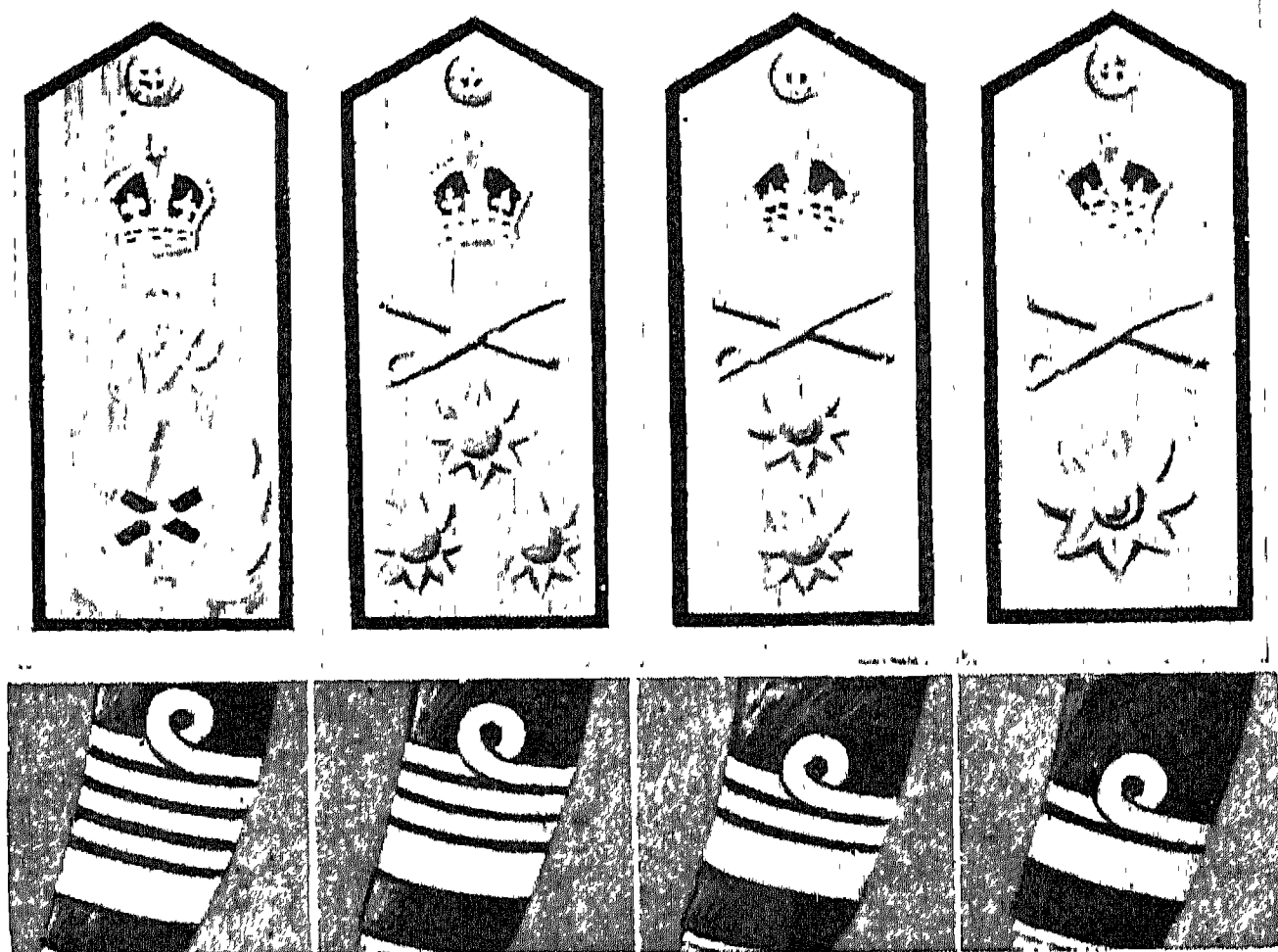
Italian *gran ammiraglio* correspond to the British admiral of the fleet. In the U.S. fleet the highest substantive rank is that of rear-admiral, but officers holding important commands are appointed fleet admirals, admirals or vice-admirals for their periods of office.

**Admiral Graf Spee.** German battleship. Launched in 1934, one of the Deutschland class of 10,000-ton "pocket" battleships, she actually displaced 14,000 tons, had a speed of 26 knots, and carried six 11-in. and eight 6-in. guns. At the outbreak of war in 1939 she preyed on Allied and neutral shipping, and was known to have sunk nine ships, a total of 50,089 tons, all but one in the S. Atlantic. In the battle of the Plate (*q.v.*), fought Dec. 13, 1939, the Graf Spee was so damaged that she fled into Montevideo harbour. Refused sanctuary, she left, Dec. 17, only to be scuttled by Hitler's orders in the chief anchorage outside the harbour. Her commander, Capt. Langsdorf, committed suicide on Dec. 20.

**Admiral Hipper.** German cruiser which gave her name to a class of four heavy cruisers. Completed in 1939, she had an alleged displacement of 10,000 tons, carried eight 8-in. and twelve 4.1 guns, and had a complement of 830. In May, 1945, she was found stranded in Kiel harbour.

**Admiral Scheer.** German "pocket" battleship with the same tonnage, speed, and armament as her sister ship the Admiral Graf Spee (*v.s.*). Notorious as a commerce raider during the opening months of the Second Great War, and damaged by torpedo in April, 1940, she was sunk in Kiel harbour by R.A.F. bombs on April 9, 1945.

**Admiralty,** BOARD OF. Governing authority of the British Navy. The Lords of the Admiralty constituting the Board are commissioners appointed by letters patent for executing the duties of a lord high admiral. The office was first put into commission in 1628, and in 1690 a declaratory Act confirmed the powers of the lord high admiral in the Admiralty Board. From 1709 onward, except in 1827-8, when the duke of Clarence was lord high admiral, the office has always remained in commission. The Navy Board, the Commissioners for Victualling, and other bodies, subordinate to the Admiralty, conducted the work of shipbuilding, dockyard work, victualling, etc.; but this divided control, which had led to many difficulties, ended in 1832,



Admiral. Insignia of rank on the shoulder straps and the left sleeve cuffs of the four officers of highest rank in the Royal Navy. Left to right: Admiral of the Fleet, Admiral, Vice-Admiral, Rear-Admiral

rank. Its first use occurs in a convention dated March 8, 1297, wherein William de Leybourne is described as Admiral of the Sea of the King of England. Commonly used to indicate any naval officer senior to a commodore, it is properly applied only to those who stand in seniority between vice-admirals and admirals of the fleet.

In the British Navy a captain selected for promotion becomes a rear-admiral, but may be retired at once if he has not completed the necessary qualifying service, or if the Admiralty do not propose to offer him further employment, the latter including, for this rank, the command of naval establishments and small squadrons, and the subordinate command of larger naval forces. Rear-admirals are compulsorily retired on reaching the age of 60, or on completing two and a half years from their last service. Promotion to vice-admiral is by selection, but if a rear-admiral has not hoisted his

promotion if the officer had not served as a vice-admiral. Advancements to the rank of admiral of the fleet are made by the sovereign's selection, subject to qualifications as to service. Officers of this rank are rarely given employment, but are borne on the active list for life.

Admirals when on active service fly a flag indicative of their rank, whence the term flag officer. The admiral of the fleet's flag is a Union flag, and the admiral's a plain S. George's cross, while vice- and rear-admirals have respectively one and two red balls on the canton or cantons next the staff. Until 1864 the flag ranks below admiral of the fleet were subdivided into those of red, white, and blue squadrons, the rank of Nelson at Trafalgar being vice-admiral of the white.

In nearly all foreign navies the system as regards flag rank is similar to that in the British. The German grand-admiral and the

them were abolished in 1890, their jurisdiction being transferred to other courts.

**Admiralty Arch.** Triumphal arch in London. It is at the entrance from Trafalgar Square into St. James's Park, and commands a fine view along the Mall with the Victoria Memorial and Buckingham Palace at the other end. Designed by Sir Aston Webb, it is part of the national memorial to Queen Victoria. It is a triple arch,

troops 1914, and included in Australian mandated New Guinea 1920. The Japanese overran the islands early in 1942, but U.S. forces, landing on Los Negros I. on Feb. 29, 1944, were in control of the group by March 18. Manus was then made into a U.S. base, handed back to Australia 1946.

**Admiralty Unit.** Practical unit of electrical capacity adopted by the Admiralty. Also called a jar (from Leyden jar). Equals

to which he has been presented by the patron is performed by the bishop of the diocese, and the clerk cannot enter on the cure of souls without it.

**Admittance.** Term used in English law. On a change of ownership of a copyhold the new tenant had to be admitted by the lord of the manor, who was always, or nearly always, entitled to a fine for the admittance. This used to take place in a court, attended by the tenants of the manor. The Law of Property Act, 1922, abolished copyhold tenure as from Jan. 1, 1926.

In electricity, admittance is the reciprocal of impedance ( $q.v.$ ), applied particularly to alternating current circuits.

**Adobe.** Spanish word meaning sun-dried brick. The term is in common use in the south-western U.S.A., taken over from the Mexicans. These bricks are made of mud, chopped straw or similar material being added to prevent cracks in the drying. They were used by the Aztec and other ancient peoples of Mexico and also by the Spanish settlers, who had long been familiar with them in Spain. They were later adopted in the south-western United States.

The bricks are built into walls, mortared with mud of the same type. The walls are then generally smoothly finished with mud and given a final coating of lime-wash. They are useful for single storey structures, and, if protected by projecting eaves, will last a long time in dry countries.

The word adobe is also used for the earth from which the bricks are made and for any structure made of the same material. In some areas the adobe mixture is moulded layer by layer straight into a wall. The term adobe is confined to Spanish and American usage, but mud-brick has always been widely used in dry countries.

**Adolescence** (Lat. *adolescere*, to grow up). Term applied generally to the condition or process of growing, and specifically, in human beings, to the period of growth between puberty and the full development of the body. Adolescence extends from about the age of 14 years to 25 in males, and in females from about 12 to 21.

**Adonai** (Hebrew, My Lord). Term used by the Jews, in reading scripture, wherever the divine name YHWH (Yahveh) or JHWH occurs alone, from fear of guilt under Lev. 24, 16. In the English version of the O.T., Lord is printed in capitals when used to



Admiralty Arch. Floodlit view, from the Mall, of the Arch, erected in 1910. The statue in the foreground is that of Captain Cook

connected by a bridge with the Admiralty offices, hence its name. The Admiralty library is housed in rooms surmounting the arch.

**Admiralty Droits.** Rights which were at one time the perquisites of the office of the lord high admiral. In 1702 they were surrendered to the Crown, and now form part of the public revenue. All ships, boats, or cargoes, flotsam, jetsam, and lagan, or wrecks and treasure found in the high seas outside territorial waters; all goods and property taken or recaptured from pirates; all royal fishes, such as whales and sturgeons; ships or goods captured from an enemy by a private ship; enemy ships or goods found in British ports or creeks are droits of admiralty. If soldiers from the land capture an enemy ship it is not a prize, but a droit of admiralty.

**Admiralty Islands.** Group of islands in the Pacific, N. of New Guinea, under Australian trusteeship. Their total area is some 800 sq. m. Pop. 14,500. Manus, the largest, about 55 m. long, is mountainous but fertile. The islanders are of Papuan origin. Coconut trees abound, and the pearl fisheries are valuable. Discovered by the Dutch in 1615, a German protectorate from 1885, they were occupied by Australian

one-nine-hundredth of a microfarad. See Capacity; Condenser.

**Admission** (Lat. *admittere*, to let in). Term used in English law. In civil proceedings it is equivalent to confession in criminal proceedings; i.e. it is a statement made by a party (plaintiff, defendant, pursuer, etc.) to an action or suit, and is always evidence against the party who makes it. All things written by a party are admissions, e.g. entries made by him in books of account; but a verbal admission can be testified to by anyone who heard it made.

An admission may be made by gesture or conduct as well as by words; and an admission made by an agent, while acting in the matter for which he is employed, is evidence against his principal. But an admission made by an agent after his employment has ceased cannot be used against the principal. An admission is generally conclusive against the person who made it, unless he shows that he spoke or wrote under a misapprehension. As a general rule, admissions by a wife are not evidence against a husband, but they will be evidence if she made them while acting as his agent.

In the Church of England the admission of a clerk to the living

Virgin Mary; and *dulia*, homage to the angels and saints. In art, adoration may mean a representation of the visit of the Magi to the Infant Christ, or a symbolic picture of worship of God in heaven.

**Adour.** River of France. The ancient *Aturus*, it rises in the Pyrenees and flows over 200 m. N. and W. through Hautes-Pyrénées, Gers, and Landes to the Bay of Biscay below Bayonne. It is navigable for about 80 m., and is in parts canalized.

**Adowa** OR **ADOA.** Town of Abyssinia. Capital of the prov. of Tigré, it stands 6,270 ft. above sea level, and is the chief centre of trade between the interior of Tigré and the coast. Scene of an Italian military reverse in 1896, the town was captured by the Italians on Oct. 6, 1935, during their conquest of Abyssinia, but was liberated by British forces April 5, 1941. Pop. about 5,000. See Abyssinia; E. Africa Campaign.

**Adowa, BATTLE OF.** Fought March 1, 1896, between the Italians and the Abyssinians. Anxious to enlarge their African territories, the Italians made a treaty with Menelek, Prince of Shoa, providing him with arms in return for certain concessions. The parties quarrelled. After a success at Coatit, in 1895, an Italian army entered Abyssinia and met with two reverses. Their general, Baratieri, then concentrated his army of about 25,000 men, including 15,000 natives, in a fortified camp in the hills. Hard by were encamped 120,000 Abyssinians, most of them armed with French rifles. Baratieri was prepared to wait in the hope that hunger would compel his foe to move, but being urged to act by the Italian premier Crispi he continued operations.

Dividing his striking force into four brigades, each about 4,000 strong, Baratieri arranged for a night march through the hills. Maps and guides were untrustworthy, spies numerous, and the Italian plans failed. One brigade, the left, took a wrong direction, was attacked by overwhelming numbers and almost annihilated, while another, the right, sent to its succour, after a stubborn engagement was destroyed. The two remaining brigades, with a victorious enemy around them, suffering from thirst and weariness, were ordered to retire. The Italian losses were over 6,000 killed and about 4,000 taken prisoner. The Abyssinians lost between 15,000 and 16,000.

**Adramyti** OR **EDREMID.** Seaport of Asia Minor in the Turkish vilayet of Balikesir. It stands at the head of the gulf of the same name opposite Mitylene, and 80 m. N. of Izmir. Adramyti Gulf is an arm of the Aegean.

**Adrano.** Town of Sicily, in Catania prov. At the S.W. foot of Mt. Etna, 22 m. by rly. N.W. of Catania, it has a Norman keep and a convent founded by Roger I in 1157. The ancient *Hadrannum*, famed for its temple of the god *Hadrannos*, it was refounded by Dionysius the Elder c. 400 B.C. Near by Sicilian inscriptions, undeciphered, have been found. Pop. (1951) 26,385.

**Adrar** (Berber, highlands.) Descriptive name of several areas in the Sahara. *Adrar Ahnet*, a district of French Sahara, is an elevated region lying S.S.W. of the Hoggar mts. It is extremely barren, and is inhabited by nomadic Tuaregs. *Adrar Iforas* forms part of a desert plateau lying N.E. of Timbuktu. Most of the people are nomadic, but there are settlements at Tassalit and Teleyet. From 1903 it was extensively explored by the French government with a view to the construction of a Trans-Saharan railway from Algiers to Timbuktu.

*Adrar Suttuf* is a region of Rio de Oro, Spanish Africa, in the S.W. of the colony, immediately S. of the Tropic of Capricorn. A mountainous district, yielding salt deposits, it was confirmed in Spanish possession by a boundary treaty with France in 1900. The area is about 2,200 sq. m.

*Adrar Temur* is an administrative district of Mauretania, French Sahara. Lying to the N.E. of the Senegal river, it is mountainous and arid but with numerous oases. The principal centres of population are Atar, where date palms are found, and Shingeti, where caravans start for St. Louis in Senegal with dates, ostrich feathers, and gold dust. Salt is mined in the Ijil district adjoining Rio de Oro. Other places are Wadan and Ujeft. The mixed population of Berbers, Arabs, Tuaregs, and Negroes is estimated at 10,000.

**Adrastus.** In Greek legend, king of Argos and Sicyon. With six other chiefs, he organized the expedition of the Seven against Thebes to restore the fugitives Tydeus and Polyneices, in which all the leaders perished except himself. Ten years later he led the Epigoni (sons of the fallen) in a second war, in which Thebes was taken and destroyed.

**Adrenal Gland.** See Supra-renal Gland.

**Adrenalin** (Lat. *renes*, the kidneys). Active principle of the supra-renal gland, a small organ attached to the kidneys. It was discovered in 1901, and is a very powerful astringent. It maintains the muscular tone of the arteries and its lack produces Addison's disease (*q.v.*). Injected into the tissues, it causes the smaller blood vessels to contract and so arrests bleeding and reduces local congestion; it is, therefore, effective in hay fever, asthma, and oedema of the larynx. Adrenalin is used in local anaesthetics. During physical effort or excitement adrenalin releases sugar from the liver into the blood, thereby increasing bodily energy. See Endocrine.

**Adria.** Episc. town of Italy, in Rovigo prov. On the Bianco canal, between the Po and Adige rivers, 26 m. S.W. of Venice, it is built on the site of the once important Etruscan port of *Hatria*, whence the Adriatic, now some 13½ m. distant, derived its name. Pop. 11,878.

**Adrian.** Christian name derived probably from the town of *Hatria*, or *Hadria*, the modern *Adria*, in northern Italy. It was borne by six popes, two of whom (III and V) were unimportant. The Roman emperor of this name is usually known as *Hadrian* (*q.v.*).

**Adrian.** Roman saint, martyr, and soldier. Converted by witnessing the heroism of some Christian martyrs, Adrian was put to death at Nicomedia, March 4, 303. He is regarded as the patron saint of the soldier, and numerous churches in Flanders are named after him. His festival is kept on Sept. 8. According to legend Adrian's limbs were cut off on an anvil, an emblem which appears on representations of his figure.

**Adrian I.** Pope 772-95. A Roman by birth, he is chiefly known through his association with Charlemagne. When the king of the Lombards, Desiderius, attacked his possessions, Adrian successfully invoked the aid of the Frankish king, and Desiderius was driven out. Adrian I restored some of the Roman aqueducts.

**Adrian II.** Pope 867-72. By birth a Roman, he succeeded Nicholas I. He was concerned in the affairs of the Frankish empire, then in a state of decay, but had little authority, and the emperor Louis II was his master.

**Adrian IV.** Pope 1154-9. Nicholas Breakspear by name, he was the only English pope, being





Adriatic Sea, which Italian policy between the two Great Wars aimed at converting into an Italian lake by the strategic domination of both shores

colour the Adriatic is greener and darker than the Mediterranean. Its navigation by steamer is easy, but sailors find it dangerous in winter because of sudden gales. It abounds in fish, and sponges are found. Chief ports: Venice, Ancona, Bari, and Brindisi on the W.; Trieste, Pola, Fiume, Zadar, Split, Dubrovnik, Kotor, Durazzo, and Vlone (Valona) on the E.

During the First Great War naval forces of Italy and Austria-Hungary were continuously engaged in the Adriatic, and for a time both sides suffered considerable losses, with the advantage to the Austrians of possessing excellent harbours on the Dalmatian coast. But Italy, assisted by her allies, gradually gained effective control, and in raids on the har-

bours of Trieste and Pola sank or damaged powerful Austrian units. A barrage of submarine nets and mines was maintained across the strait of Otranto, and guarded by British ships.

The Italian landing at Durazzo on April 7, 1939, and the subsequent annexation of Albania, marked a further stage in the attempted fulfilment of Italy's aim of securing the Adriatic as an Italian lake. The Adriatic again became an important area during the Italian campaign against Greece, 1940-41, when Italian supplies were maintained from Bari and Brindisi to Durazzo and Vlone. British warships made a sweep of the Adriatic as far N. as Bari and Durazzo on Dec. 18, 1941. On the capitulation of

Italy in Sept., 1943, and the surrender of her fleet, her Adriatic seaboard was gradually occupied by Allied forces, which captured Rimini Sept. 21, 1944, and entered Trieste May 2, 1945. A British military mission, which reached Albania in April, 1943, began to train an army of Albanian patriots, eventually 20,000 strong, to wage guerilla war against German occupying forces. A British commando force, called Land Forces Adriatic, came into existence in July, 1944, and, in co-operation with the R.A.F. and the R.N., landed in Yugoslavia in Aug. and in Albania in Sept. to assist the guerillas in both countries. The Germans had withdrawn from the Albanian and Yugoslav coasts by the end of the year. For fighting on the Adriatic sector of the Italian front, see Italy: Campaign in. See also Trieste.

**Adshead**, STANLEY DAVENPORT (1868-1946). British architect. Born in Manchester, he devoted special attention to town-planning, and was professor of town-planning at Liverpool University, 1909-14, and at London University, 1914-35. His works include Ramsgate and Worthing pavilions, and the rebuilding of the duchy of Cornwall estate, Kennington, 1913-14. He wrote *Town-Planning and Town Development*, 1923; *A New England*, 1942. Adshead died April 11, 1946.

**Adsorption** (Lat. *ad*, to; *sorbere*, to suck up). Term meaning absorption at the surface of a solid body. In a crystal of common salt, NaCl, there is, except at the surface, a regular arrangement of the atoms of chlorine and sodium; each

have been extensively copied in other countries, although only the English-speaking countries and Scandinavia have full systems of adult education as understood in the U.K. British institutions owe little to overseas models apart from that of Denmark, the aims of which were often quoted by those responsible for founding British residential colleges.

Adult education in under-developed countries is usually concerned with the improvement of living standards and self-respect through the adoption of improved techniques; but literacy and studies of great cultural importance are often linked effectively with this so-called "fundamental" education. International organizations like U.N.E.S.C.O. have fostered the provision and study of adult education throughout the world. The importance of adult education is also recognized in practice by the provision of educational opportunities in most firms or industries of any size. *See also Further Education.*

**Adulteration** (Lat. *adulterare*, to corrupt). Term meaning the debasement of anything by the substitution for one or more of its proper ingredients of something inferior. Pliny in the 1st century A.D. mentions frauds by bakers who added a soft white earth to bread; in ancient Athens adulteration of wine led to the appointment of an official to stop the practice. Severe punishments were inflicted during the Middle Ages upon fraudulent vendors of foods. Bakers, brewers, vintners, and "pepperers" who offended were set in the stocks, whipped, branded, or turned out of the town.

Adulteration of food has been the subject of incidental legislation from the time of Henry VIII, but until the early part of the 19th century the object of this legislation was to protect the revenue from the loss of excise duty that was entailed when excisable goods were adulterated—*e.g.* if what was sold as tea (which was dutiable) consisted in fact in the main of some non-dutiable substitute. Only since the early part of the 19th century has it been increasingly accepted that it is a function of the state to promote the welfare of citizens and to concern itself from that point of view in matters such as the purity of food. The Food and Drugs Act, 1938, and the Food and Drugs (Milk, Dairies, and Artificial Cream) Act, 1950, restricted the addition of any injurious substance to food, or the

abstraction of any substance so as to affect injuriously the nature, substance, or quality of the food; forbade incorrect labels or advertisements; gave to the appropriate authority wide powers for making regulations as to the importation, preparation, storage, sale, or delivery of food; and imposed penalties for selling unsound food. The Food and Drugs Amendment Act, 1954, gave still wider powers to the appropriate authority. *See also Analyst, Public.*

**Adultery** (Lat. *ad*, to; *alter*, other). Sexual connexion by a husband or wife with someone other than the lawful spouse. In English law, adultery by either husband or wife constitutes ground for divorce, though adultery without any other matrimonial offence by a husband was made so only in 1923.

**Adur.** River of Sussex, England. About 20 m. long, and for much of its length navigable for sailing barges, it rises near Horsham and flows through a gap in the South Downs to enter the English Channel at Shoreham. Beside or near this river are the ruins of Knapp and Bramber castles, and St. Nicholas College, Lancing, whose fine but unfinished modern Gothic chapel is a landmark.

**Advancement.** In English law, where a man buys property and has it conveyed not into his own name but into the name of a person who is his wife or child or someone to whom he stands in loco parentis, it is presumed, unless the contrary is proved, that he intended to make a gift of the property to that person; this is called presumption of advancement. If an infant is entitled to the capital of a trust either absolutely or contingently—*e.g.* on his becoming 21—the trustees may under the Trustee Act, 1925, pay for his advancement or benefit up to half his share, subject to certain conditions.

**Advancement of Learning,** THE. Philosophical work by Francis Bacon, first published in 1605. Its object was to survey the whole field of human knowledge, and note such "omissions and deficiencies" as should be made good by learned men. Bacon divided learning into history, poetry, and philosophy, which he envisaged as corresponding to memory, imagination, and reason, the principal faculties of the mind; and then subdivided these parts. He advocated the use of induction as a means of increas-

ing scientific knowledge. In 1623 a Latin translation, with considerable additions, was issued as *De Augmentis Scientiarum*.

**Advent** (Lat. *adventus*, arrival). In the ecclesiastical year of the western churches, the four weeks immediately preceding Christmas, reckoned from the Sunday nearest to St. Andrew's Day. Beginning the church year, this season is observed as one of solemn preparation for Christmas and for the second Advent or Parousia (Matt. 24 and 25). According to one view, this Second Advent is past and judgement is proceeding. The early Church kept a 40 days' fast before Christmas. The words *O Sapientia* in the calendar (Dec. 16) open a Latin anthem still sung in R.C. churches during Advent.

**Adventists.** Name of several sects, mainly of American origin. The Second Adventists, founded in 1831 by William Miller (1782-1849), believe in the imminence of the Second Advent, and have repeatedly assigned dates for it. Seventh Day Adventists date from 1845, believe the Second Advent imminent, but do not predict its date. They observe the 7th day of the week as the Bible Sabbath, emphasise temperance, and promulgate rules of health.

**Adventurers.** In general, men who go forth in search of something vague or unknown. In English history the term is applied to those who, in the time of Elizabeth I, went out to seek wealth in Muscovy, Cathay, or the Indies by plundering the Spaniards, or in other ways; to those who bought and settled on the land in Ireland confiscated after the rebellion of 1641; and to those who, in the 17th and 18th centuries, drained the fenlands of East Anglia.

**Adverb** (Lat. *ad*, to; *verbum*, word, verb). Indeclinable part of speech added to verbs, adjectives, and other adverbs to define their meaning more closely. Adverbs are divided into those of place (here, there), time (now, then), quantity (more, less), manner (well, ill), and others. They were originally cases of nouns.

**Advertisement Duty.** Tax on advertisements in force in the United Kingdom from 1712-1853. It was a stamp duty charged on all advertisements in newspapers at the rate of 3s. 6d. for each paragraph. In 1833 it was 1s. 6d. in Great Britain and 1s. in Ireland, and in 1853 it was abolished. In 1830 it produced £170,000, of which *The Times* paid £70,000.

# Pears' soap.



*Two years ago I used Pears' Soap  
Since when I have used no other!*

Advertising. Famous "Punch" drawing by Harry Furniss, first used as an advertisement in 1885

shrinkage of the size of the homes in which even the wealthy lived, to artists of even the greatest distinction a commission to draw or paint pictures for use in advertisements came to be acceptable; and for the good, average artist, working for an advertisement agent was considerably more rewarding than working as an illustrator for the editorial side of periodicals.

#### Extension to New Mediums

The enterprising agent was not content simply with developing advertisements in periodicals. He developed also poster advertising; advertising on buildings by signs, lighted at night; with the invention of the aeroplane, "sky writing"; with the development of the cinema, advertising films, and slides to be shown during the intervals of performances; advertising by radio and television—these two forms something of a reversion to the ancient, primitive, vocal advertisement. All these later forms of advertising have the disadvantage that they are addressed to the world at large, not to a selected part of it, as is advertising in periodicals, and the only half-attentive passer-by, listener, or viewer tends to associate the compelling "slogan" put out by firm A with a similar product put out by firm B which he happens already to be in the habit of buying.

Work in an advertisement agency has its hectic moments

alternating with periods of dull routine. A maker of motor-cars, say, approaches that well-known advertisement agency, Messrs. XYZ, and says he is not satisfied with his sales, and is considering an advertisement campaign. The first thing that he is asked to consider is how much he is prepared to spend. When that is settled, a schedule is drawn up by the media department suggesting how the money should be laid out, down to the amount of space that should be bought in each selected journal and the number of repeats; the number of minutes that should be bought over the air, and the number of repeats; and, where poster advertising is considered suitable, the sites that should be used and for how long.

When the motor-car maker has passed this schedule, with or without

amendment, the copywriters go to work. With infinite labour and many re-writings they turn out what they hope will prove powerful sales-talk. It is carefully adapted to the particular medium in which it is to be used, and probably differs from one periodical to another; as a poster, or over the air, the same material will be presented from still another angle. Then, for printed versions and posters, the type-specialists and artists take over and turn out rough layouts which are submitted to the car-maker for approval, together with details of the proposed radio and television programmes. The roughs selected are worked up into finished drawings, with appropriate type-setting, and the results are made into blocks of a suitable size and delivered to the selected periodicals; the posters are completed and printed in colour for distribution to selected bill-posting organizations; the material for radio and television is passed to the chosen producer.

If the product that is to be advertised is small and is handled with many other similar products by retail shops, the agency will concern itself with the style of the packaging or bottling of the pro-

duct, the shape and style and content of any labels used, or other reading matter accompanying it, as well as with the placing of press and other advertisements.

Everything, in fact, is considered not only in order to give the product an agreeable appearance, but also to make it stand out from its competitors in a counter display.

#### Localised Advertising

Advertising through the post by means of circulars and catalogues is another method much used, especially locally, by furnishing, radio and television, and other retail firms. The special display in windows and inside shops drawing attention to the goods supplied to the retailer by particular manufacturers is still another form of manufacturer's advertising. The cost of printing and paper and distribution has virtually wiped out the massive catalogues that, during about 1880-1920, were distributed regularly and free by many large firms; in the U.S.A., where an immense amount of business in the form of orders by post used to be done through such catalogues, their end was confirmed by the phenomenal growth of radio and television advertising (still, however, in 1953 absorbing only about one-sixth of the total estimated amount spent in that country on advertising).

Assessment of expenditure on advertising is very much a matter of guesswork. In the U.K. it probably totals at least £100,000,000 a year; in the U.S.A. probably ten times as much. In



## Rowland's Macassar Oil

has been for 100 years unsurpassed as the best and most powerful promoter and beautifier of the hair, and is far preferable to other hair restorers, which are really progressive dyes, and deposit a sediment on the scalp which fills up the pores; it promotes and loosens the hair, grows thickly, causes never to be lost falling out, and the hair grows and remains, and, being most luxuriously perfumed, is a perfect toilet luxury for everyone. Also sold in a golden colour for fair-haired ladies and children.

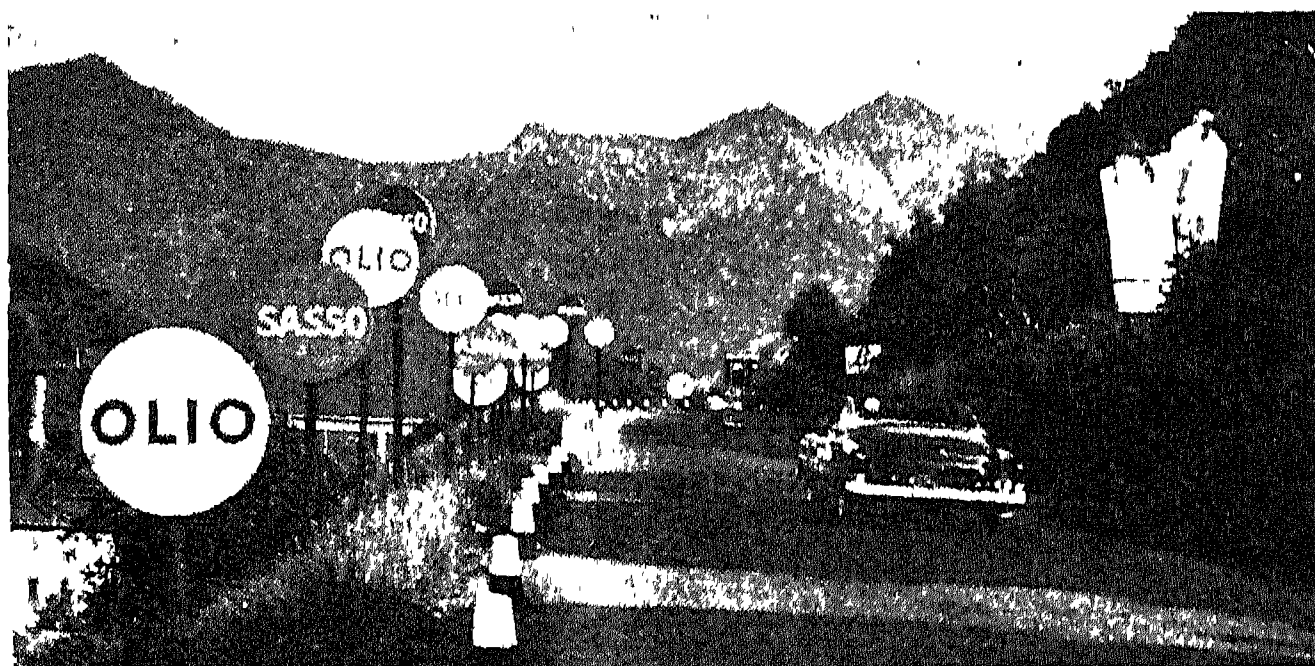
Bottles, 6s. 6d., 7s., 10s. 6d.

Advertising. Simple illustrated advertisement reproduced from a 19th-century periodical

the U.K. the cost of advertising is allowable in income tax assessment as an expense of business management, and a heavy rate of tax tends to increase expenditure on advertising. The advertisement agent holds that advertising promotes a high standard of goods. This is certainly true to the extent that no amount of advertising will continue to sell poor goods.

It is also sometimes argued that advertising, by increasing demand increases output and reduces therefore the cost of production of each example of a particular product, thus tending to reduce prices. No doubt there was some truth in this





A roadway in Italy where the fine view of the distant mountains is obscured by a series of advertisements for a particular brand of olive oil



Ingenious use of the unusual in advertising a road-safety campaign : it would be a rare passer-by whose attention would not be attracted

argument when business was, like nature, red in tooth and claw: witness the £5 Atlantic passages of the early years of the 20th century when several shipping companies were competing for the privilege of carrying thousands of emigrants to the lands of promise in America. But big business saw the folly of this kind of competitive advertising, and standard prices, grouping of formerly competing firms, put an end to true competitive advertising, and to its natural effect on prices.

A great deal of the thought and labour put into the preparation of advertisements is wasted because it may be only at the twentieth (or hundredth) attempt that an acceptable form of words or display is achieved ; but advertising work nevertheless has many attractions as a profession, and on the percentage basis on which agencies are run produces handsome incomes for a few, and well-paid employment for hundreds.

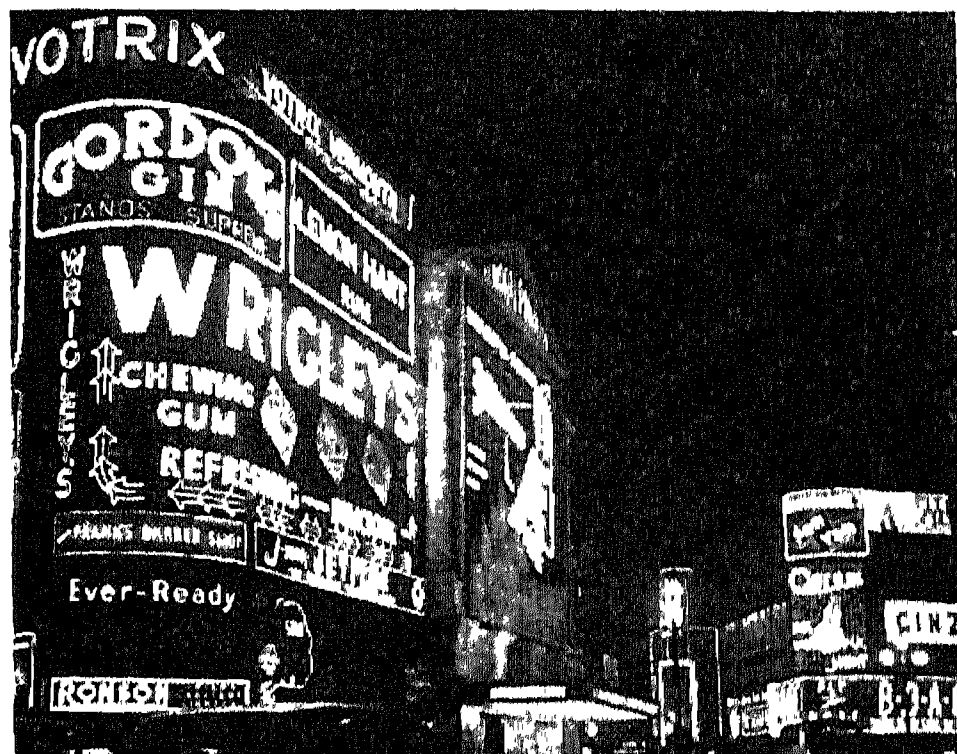
In the U.K. the Institute of Practitioners in Advertising (h.q.

44 Belgrave Square, London, S.W.1) maintains high standards among its members.

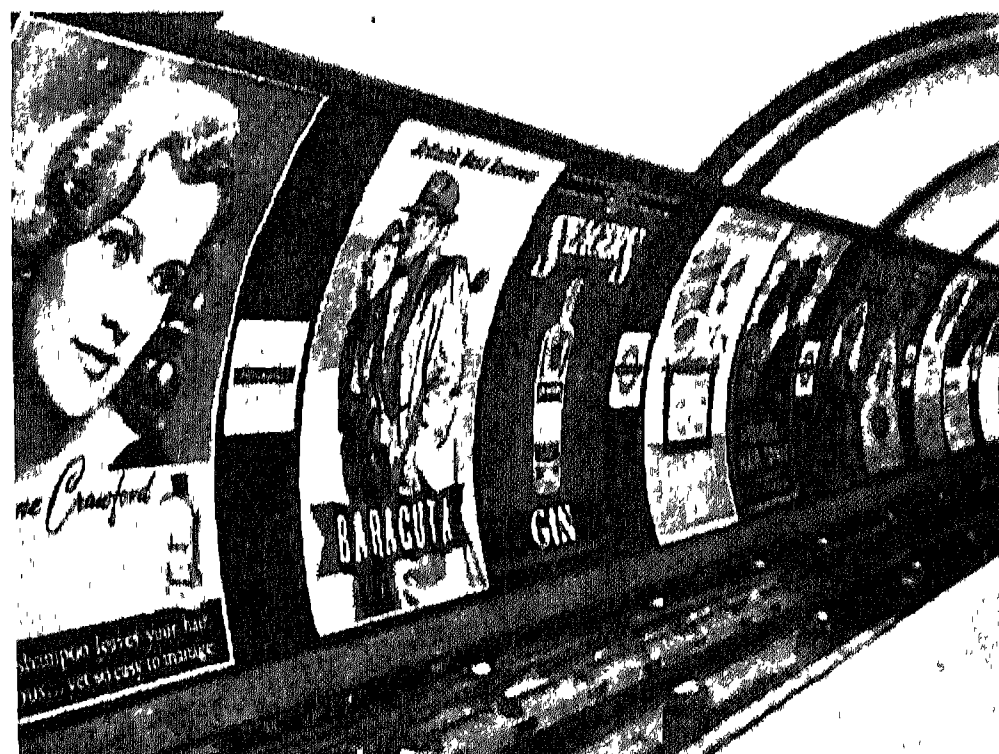
**LAW RELATING TO ADVERTISEMENTS.** In the United Kingdom advertising is controlled by the law in a variety of ways. Prohibited advertisements include the following : advertisements of any article in terms calculated to lead to its use for procuring a miscarriage or for treating certain diseases, namely Bright's disease, cataract, diabetes, epilepsy or fits, glaucoma, locomotor ataxy, paralysis, tuberculosis (Pharmacy and Medicines Act, 1941) ; or cancer, or offering to give any advice as to treatment of cancer (Cancer Act, 1939) ; advertisements of lotteries or illegal competitions (Betting and Lotteries Act, 1934) ; or of illegal betting (Betting Act, 1853 ; Betting Act, 1874 ; and Street Betting Act, 1906) ; advertisements that the parent or guardian of an infant desires to have it adopted or that a person desires to adopt an infant or is willing to make arrangements for the adoption of an



Medway Paper Sacks  
Television advertising : a boxing champion demonstrates the strength of a paper sack by using it as a punch ball



Piccadilly Circus, London, at night : always brilliantly illuminated by advertisements in ever-changing coloured lights



Posters in bright colours and of cheerful design enliven the outlook for passengers at the underground stations of the London tube railways

approval if that person, although fit to be a clergyman, is not suited to the needs of the parish.

To take money for presenting a clergyman to a living is simony, and presentation made in return for money is void.

**Adye**, SIR JOHN MILLER (1819-1900). British soldier. Born at Sevenoaks, Kent, Nov. 1, 1819, Adye was sent to the military academy at Woolwich in 1834, and in 1836 became an artillery officer. He went through the Crimean War, serving at Alma, Balaklava, Inkerman, and Sebastopol; and during the Indian Mutiny he assisted in the defence of Cawnpore while Sir Colin Campbell was relieving Lucknow in Nov., 1857. He held administrative posts in the Indian and British armies, and in 1882 went to Egypt as chief of staff to Wolseley. He was made K.C.B., 1873, G.C.B., 1882, was governor of Gibraltar 1883-86, and died Aug. 26, 1900. Adye wrote several books on military subjects, including *The Defence of Cawnpore*, 1858, and *Recollections of a Military Life*, 1895. *Pron.* ad'y.



Sir John Adye,  
British soldier

**Adyge**. Autonomous region of the R.S.F.S.R., in the Northern Caucasus. Area 1,700 sq. m. It lies between the Laba and the Belaya, two affluents of the middle Kuban river, and was made an autonomous region in 1922, as a settlement of the Adyge branch of the Circassian ethnic group, members of which comprise about 45 p.c. of the population. Winter wheat, sunflowers, and tobacco are cultivated; horses are bred. Maikop, the capital, is the centre of the important Apsheron oilfield. Pop. (est.) 300,000.

**Adytum** (Gr. *a*, not; *dyein*, to enter). Term anciently used to denote an inner sanctuary which only the priests were allowed to enter, and where oracles were delivered. Later, the term was used more widely, and a church chancel, e.g., is sometimes called an adytum.

**"A.E."** Pen-name of the Irish poet, George William Russell (*q.v.*).

**Aeacus**. In Greek legend, son of Zeus by the nymph Aegina, and king of the island named after her, where in historical times he was regarded as tutelary deity. The father of Telamon and Peleus, he

was renowned for his integrity and justice, and after his death was made by Pluto one of the judges of the underworld, Minos and Rhadamanthus being the others.

**Aedes**. Genus of mosquitoes with many species, fourteen of which occur in Great Britain. *Aedes aegypti*, also called *Stegomyia fasciata*, is of great medical importance as the principal vector of the virus of yellow fever. It is widely distributed in the tropics of the Old and New Worlds. (It does not occur in Great Britain.) In all species the eggs are laid singly, instead of in rafts as in *Culex*; they can withstand considerable desiccation. The larvae live in small and often temporary bodies of water.

**Aedile** (Lat. *aedes*, a building). Roman magistrate. In republican times the aediles had charge of public buildings, open spaces, roads, water supply, and provisioning of the city, inspection of markets, taverns, weights and measures, and of private property as its condition affected public safety. They also controlled the police, limited private display and usury, examined plays, prevented the introduction of unauthorised religious cults, and were responsible for the public games. Two plebeian aediles were first appointed in 493 B.C.; in 366 two curule aediles, i.e. patricians entitled to use the Curule Chair (*q.v.*), were added; and Julius Caesar added two more plebeians as cereal aediles to inspect the stocks of public corn. Under the Empire their functions were curtailed, and the office itself disappeared before the time of Constantine. *Pron.* ee-dil.

**Aedui** or HAEDUI. Celtic tribe, living between the Loire and the Saône. They were the first Gallic people to join the Romans, and were treated with special regard by Caesar, who defended them against external foes.

**Aeetes**. In Greek legend, king of Colchis, in Asia Minor, and possessor of the Golden Fleece. Jason and his Argonauts were assisted in their search for it by Medea, daughter of Aeetes.

**Aegades Islands** (anc. Aegates; Ital. Egadi). Three mountainous islands, Favignana, Marittimo, and Levanzo, off the W. coast of Sicily. They were the scene in 241 B.C. of the defeat of the Carthaginian fleet by the Romans under Gaius Lutatius Catulus. Goat rearing and tunny fishing are the chief industries. Pop. (est.) 7,000.

**Aegaeon**. Name among men of the figure in Greek mythology called among gods Briareus (*q.v.*).

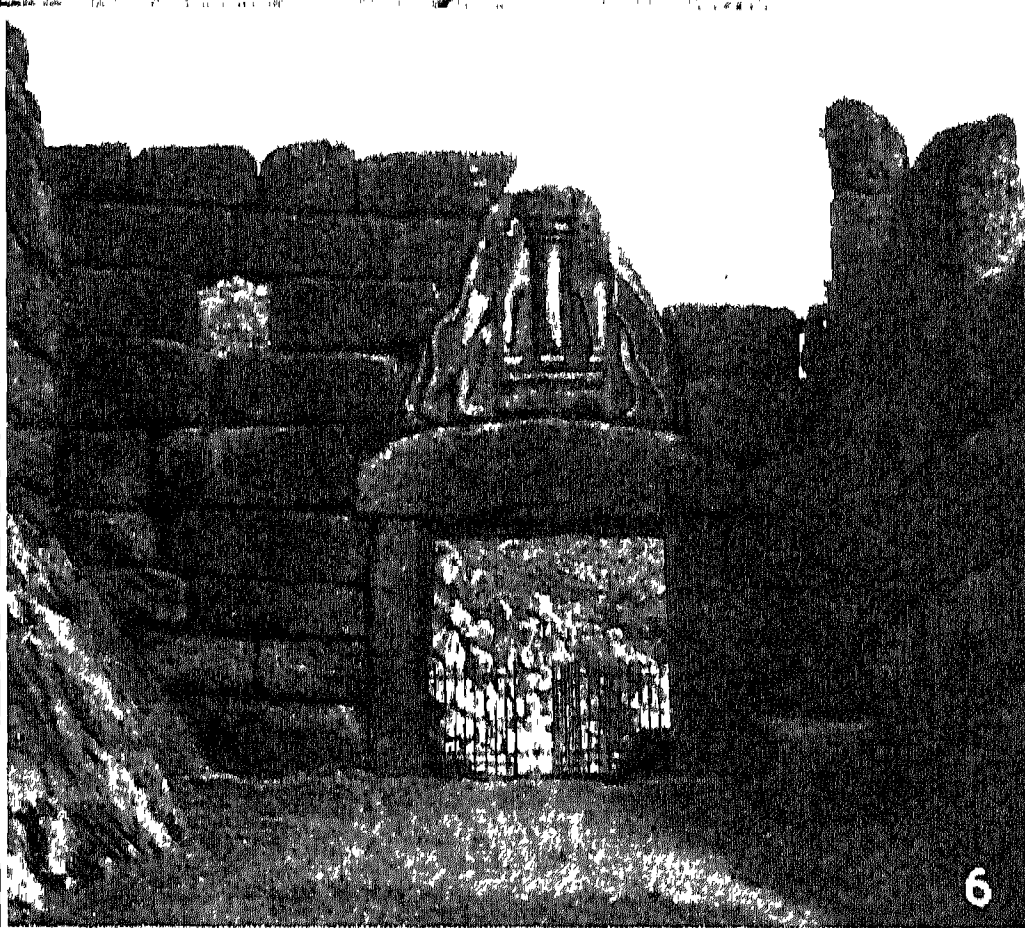
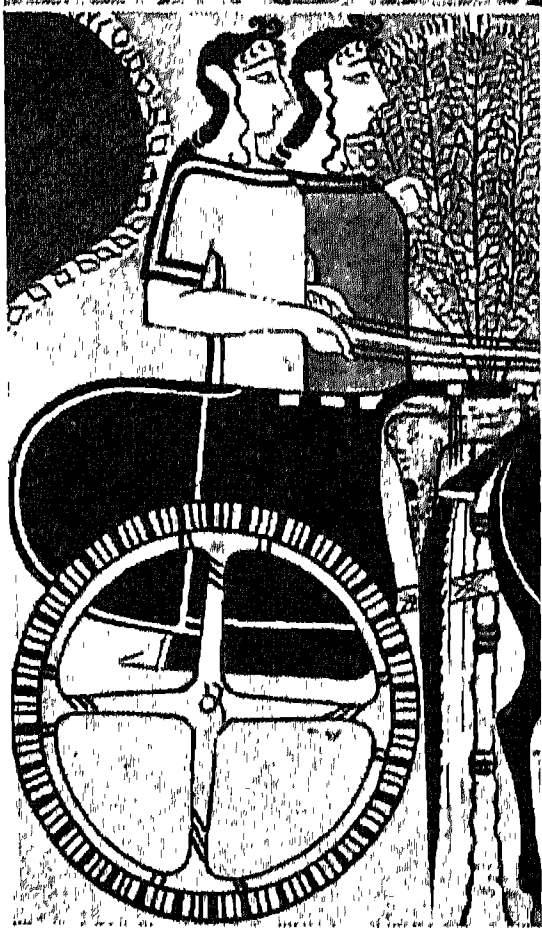
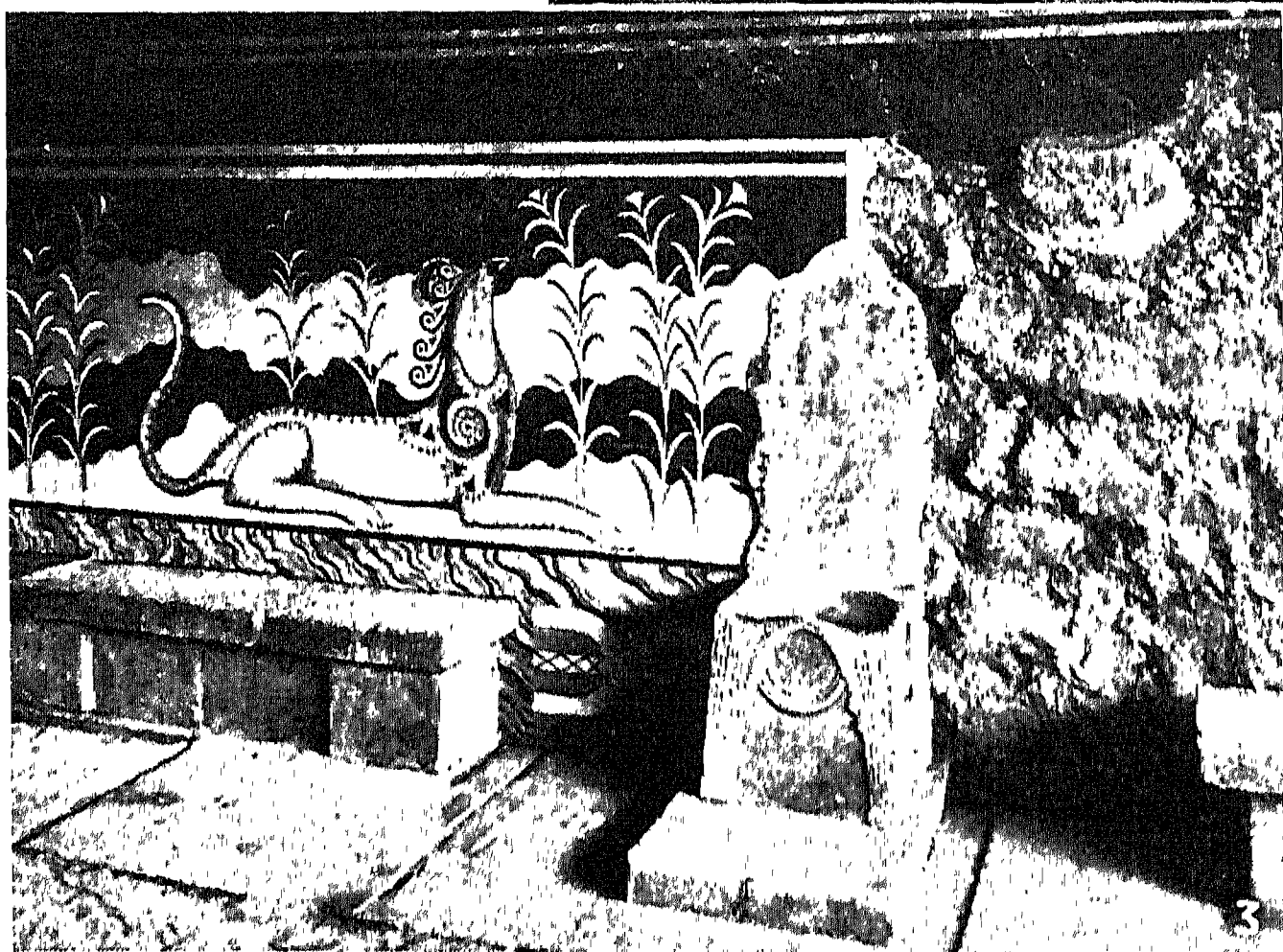
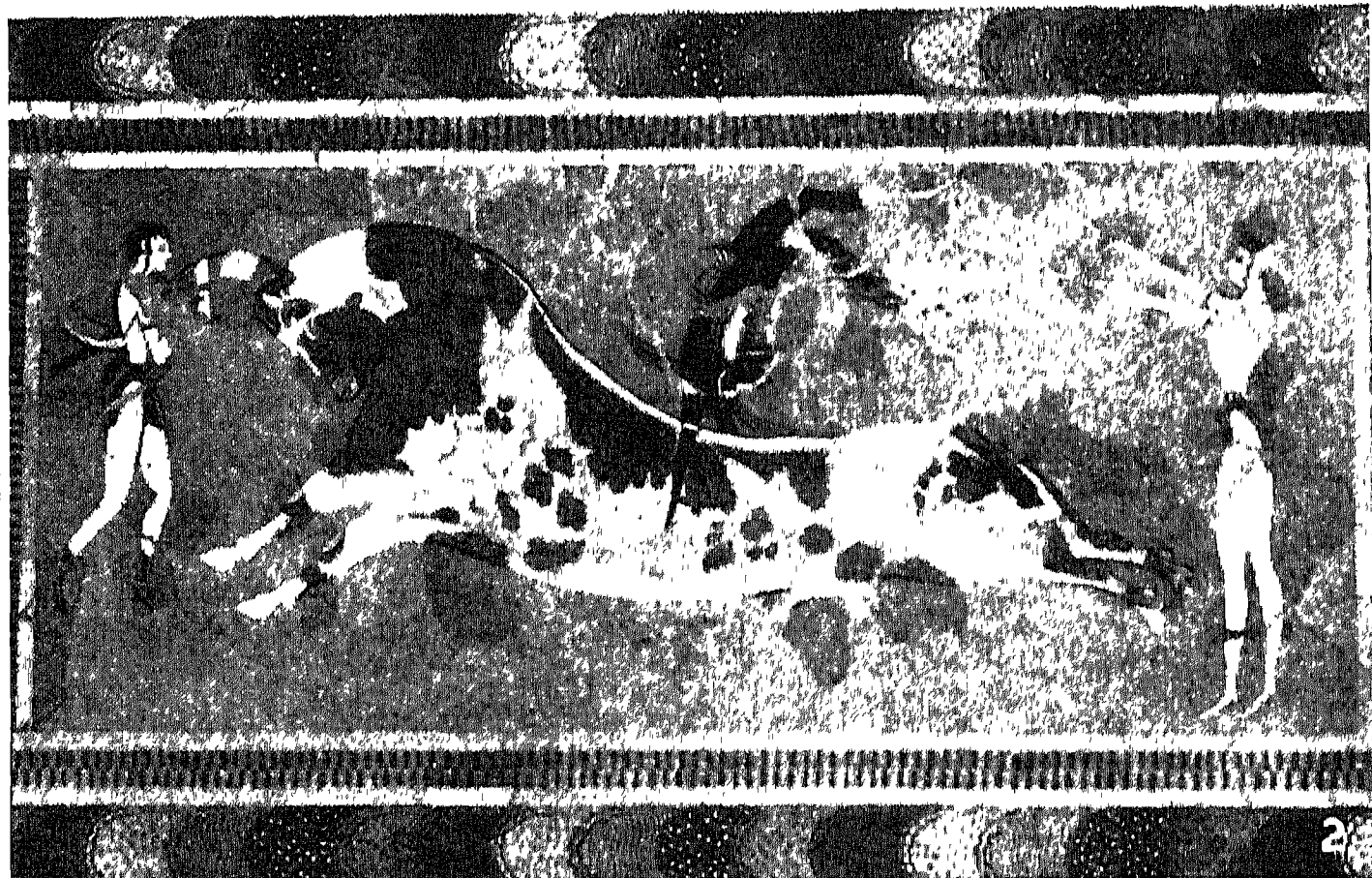
**Aegean Civilization**. Name given to the pre-Hellenic Bronze Age civilization of the coasts and islands of the Aegean Sea, exemplified by the Minoan culture of Crete and the Helladic culture of Mycenae, Tiryns, and other Greek sites. Heinrich Schliemann first revealed this civilization to the modern world by his excavations at Mycenae, begun in 1876, and Tiryns, 1884. His conviction that Crete would produce equally important results was fully justified by the discoveries made under the direction of Sir Arthur Evans at Chossus (or Knossos) in 1900 and subsequent years.

The Aegean civilization developed at the close of the Neolithic period, about 3000 B.C. Crete led the way, and its Bronze Age culture, called by Sir Arthur Evans Minoan, after the legendary king Minos, falls into three periods: Early (c. 3000-2200 B.C.); Middle (c. 2200-1600 B.C.); and Late Minoan (c. 1600-1100 B.C.). The cultures of the Greek mainland and the islands divide into approximately the same periods. Crete enjoyed its golden age in the 16th and 15th centuries B.C. Shortly before 1400 the island suffered a catastrophe, almost certainly invasion by the Achaeans of Mycenae, and the palaces and towns at Chossus, Phaistos, Gournia, and elsewhere were destroyed. The subsequent Late Minoan III period is one of slow decline.

The early, non-Aryan inhabitants of Crete probably belonged to the so-called Mediterranean stock, distinguished by long heads, dark complexions, and shortness of stature. Essentially a seafaring people, they carried on an extensive commerce, especially with Egypt. They were called Keftiu by the Egyptians and are represented in Egyptian tomb frescoes of the time of Thothmes III (1500-1450 B.C.). They excelled in the manufacture of finely-decorated pottery; they were also skilled carpenters and metal-workers. They produced large quantities of olive oil. They had a metal currency and a system of weights of Babylonian origin. The most famous Cretan site is the vast palace of Chossus, once three or more storeys high, with its public and domestic quarters built round a central court. There are a throne room, shrines, a grand staircase, the apartments of the queen, and numerous storage magazines.

The settlement of Indo-European newcomers—the Greeks—in the Aegean world was a gradual





1. Late Minoan vase ornamented with a realistic octopus (c. 1600-1500 B.C.). 2. Fresco at Knossos of a girl somersaulting over a bull. 3. Throne from the Palace of Minos, Knossos, in white stone with hollowed seat (1550-1400 B.C.). 4. Ivory and gold statuette of the Minoan

snake goddess (c. 1300 B.C.). 5. Fresco from Tiryns, a Greek prehistoric site (c. 1400 B.C.). 6. Lion Gateway at the citadel of Mycenae (after 1400 B.C.): actual state. 7. Carved steatite vase (c. 1300 B.C.) from Hagia Triada, Crete, decorated with spirited groups of boxers.

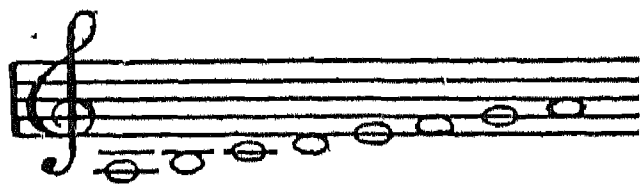
# **AEGEAN CIVILIZATION IN CRETE AND GREECE ABOUT 3,500 YEARS AGO**



**Aeolian Deposits** (Lat. *Aeolus*, god of the winds). Deposits formed of wind-carried particles of varying degrees of coarseness. They have been formed on land surfaces and may be detected among the rocks of various geological periods. The chief Aeolian deposits are the sand dunes of coastal regions, the sands of deserts—e.g. Sahara—and the great loess deposits of Asia. Wind-blown sands are remarkable for the extremely rounded character (millet seed) and high superficial polish of individual grains.

**Aeolian Harp.** Musical instrument. It consists of a box containing wires or strings loosely stretched to produce musical notes when a current of air passes through them. A gentle breeze causes low notes to sound, and as the air current increases in intensity higher notes of the harmonic series are elicited.

**Aeolian Mode.** In music, an old church mode beginning on A and using only the natural notes, the white keys of the pianoforte. The scale, therefore, was like the present scale of A minor.



Its dominant was E. See Mode.

**Aeolians.** One of the three great branches of the ancient Greeks. They spoke a dialect distinct from that of the Dorians or the Ionians. The poets Alcæus, Sappho, and Anacreon wrote in the Aeolic dialect. The original home of the Aeolians, who claimed descent from Aeolus, son of Helen, was in Thessaly, but they spread to the other parts of N. Greece, and colonised the islands of Lesbos and Tenedos and a strip of land on the coast of Mysia in Asia Minor, afterwards known as Aeolis.

**Aeolipile** OR AEOLIPYLE (Lat. *Aeolus*, god of the winds; *pila*, ball). Mechanical toy, illustrating the reaction of the air upon an issuing stream of steam in producing circular motion. It is a hollow ball of metal with hori-

zontal tubular arms, bent at right angles. When partially filled with water and heated sufficiently to generate steam from the arms, the metal globe will rotate. The invention is ascribed to Hero of Alexandria.

**Aeolotropy** (Gr. *aiolos*, shifting; *trepein*, to turn). Alteration in the electrical, optical, and other physical qualities of a body due to change of position. Thus a tube could be given a twist which would alter its electrical conductivity, and would then be said to be aeolotropic in regard to its electrical conductivity. Iceland spar is a mineral which does not exhibit the same optical refractivity in all directions. Its condition is said to be one of optical aeolotropy.

**Aeolus.** In classical mythology, king of Aeolia, one of the Lipari Islands. He was the god of the winds, which he kept shut up in a mountain. According to Homer, he gave Odysseus (Ulysses), when starting on his voyage home, a bag containing the unfavourable winds. The bag was untied by one of the crew, the winds escaped, and the ship was forced to return to Aeolia.

**Aepyornis** (Gr. *aipys*, tall; *ornis*, bird). An extinct wingless bird of Madagascar. Related to the extinct moa and the existing apteryx of New Zealand, it stood about 13 ft. high, and its fossilised eggs, occasionally found in the marshes, are a foot long and correspondingly large in circumference.

**Aequi.** Ancient Italian tribe in the Anio valley. They were long engaged in hostilities with the Romans, by whom they were finally subdued in 304 B.C.

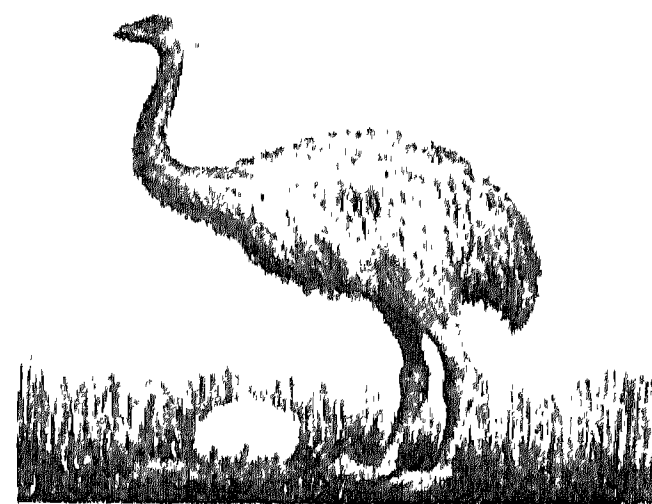
**Aerarium** (Lat. *aes*, money). Public treasury in ancient Rome, called aerarium Saturni, because the money was deposited in the temple of Saturn. Under the Empire the aerarium lost much of its importance, becoming the treasury only for the city itself and the senatorial provinces; the financial administration of the imperial provinces was a charge upon the fiscus, or emperor's private purse. At the beginning of the 2nd century A.D. the fiscus became the sole national treasury, the functions of the aerarium being confined to the city.

**Aerated Waters.** Beverages charged with an excess of carbonic acid gas (carbon dioxide) or, occasionally, oxygen. Aerated waters were originally made about 1767 in imitation of natural mineral waters, but the term now

includes beverages such as fizzy lemonade and ginger ale which contain no mineral matter.

Aerated waters were first made by machinery on a commercial scale early in the 19th century, the Struve patent (4,851 of 1823) being the earliest example of the machines employed. The essential apparatus consists of a carbonic acid gas generator, a gas-holder, a saturator, and a bottler. The carbonic acid gas is made by the action of sulphuric acid on whiting (calcium carbonate) or sodium bicarbonate, the advantage of using the sodium salt being that the by-product, sodium sulphate, is useful. In smaller installations and soda fountains, liquid carbonic acid gas, prepared by the complete combustion of coke, is employed.

When the gas is generated it is passed into the gas-holder and the pressure applied which is required in the subsequent operations. The saturator contains the water which is to be saturated with the gas. It is fitted with an agitator or mixer to ensure that the water shall take up the



**Aepyornis.** Reconstruction of the extinct bird which was 13 ft. high

maximum amount of gas. In practice four volumes of gas per volume of water is the amount allowed. If plain water is used in the saturator the product is simply aerated water, but for other varieties the different salts are first dissolved in the water. For soda-water 80 gr. of sodium bicarbonate per gallon is used; for potash water 32 gr. to 64 gr. of potassium bicarbonate; and for seltzer-water a mixture of the chloride, bicarbonate, sulphate, and phosphate of sodium.

For fizzy lemonade or ginger ale plain aerated water is used, the flavouring and sweetening, in syrup form, being placed in the bottles or siphons before the aerated water is added at the bottling machine; this varies according as corked or stoppered bottles or siphons are being filled.

**Aerobatics** (Gr. *aerobatein*, to walk the air). Abnormal but controlled evolutions and trick manoeuvres carried out with aircraft in flight. Looping the loop, the best known aerobatic, was evolved by the pioneer French pilot Adolphe Pégoud in 1913. He also introduced upside-down or inverted flying, and the roll, in which the aircraft executes a complete revolution in the rolling plane.

Other forms of aerobatics are the half roll, the half roll on the top of a loop, the spin, and the sideslip. In the half roll the machine turns over on to its back, the nose drops and, after the direction of flight has changed by 180 degrees, level flight is resumed at a lower altitude. In the half roll on top of a loop the pilot flies his aircraft to an inverted position as though he were looping and, when upside down, returns to normal flight by turning right way up through rolling. Height is gained in the process and the direction is changed by 180 degrees. In the sideslip the aircraft descends forwards and sideways, losing height rapidly. In the spin the aircraft descends vertically and rolls at the same time, so following a spiral track downwards.

The stall turn and Immelmann turn were military aerobatic manoeuvres introduced in the First Great War. The stall turn consists of a rapid climb followed by a cart-wheel movement and a dive towards the direction from which the machine had formerly been flying. The Immelmann turn, named after the German fighter pilot, was basically the same. The falling-leaf was yet another aerobatic developed in the First Great War. It consisted of a descent (with the engine switched off or idling); the up-and-down movement of a leaf fluttering to the ground was simulated by rocking the aircraft from side to side.

There was a marked development in the art of aerobatic flying between the great wars. The bunt, a popular manoeuvre, consists of pushing the aircraft into a vertical dive, flying it on to its back and then bringing the nose upward and over until level flight is resumed. The bunt is, in fact, an inverted loop. In the inverted spin the pilot is on the outside of the spin and, as in the bunt and inverted turn, forces are introduced which tend to dislodge the pilot from the cockpit.

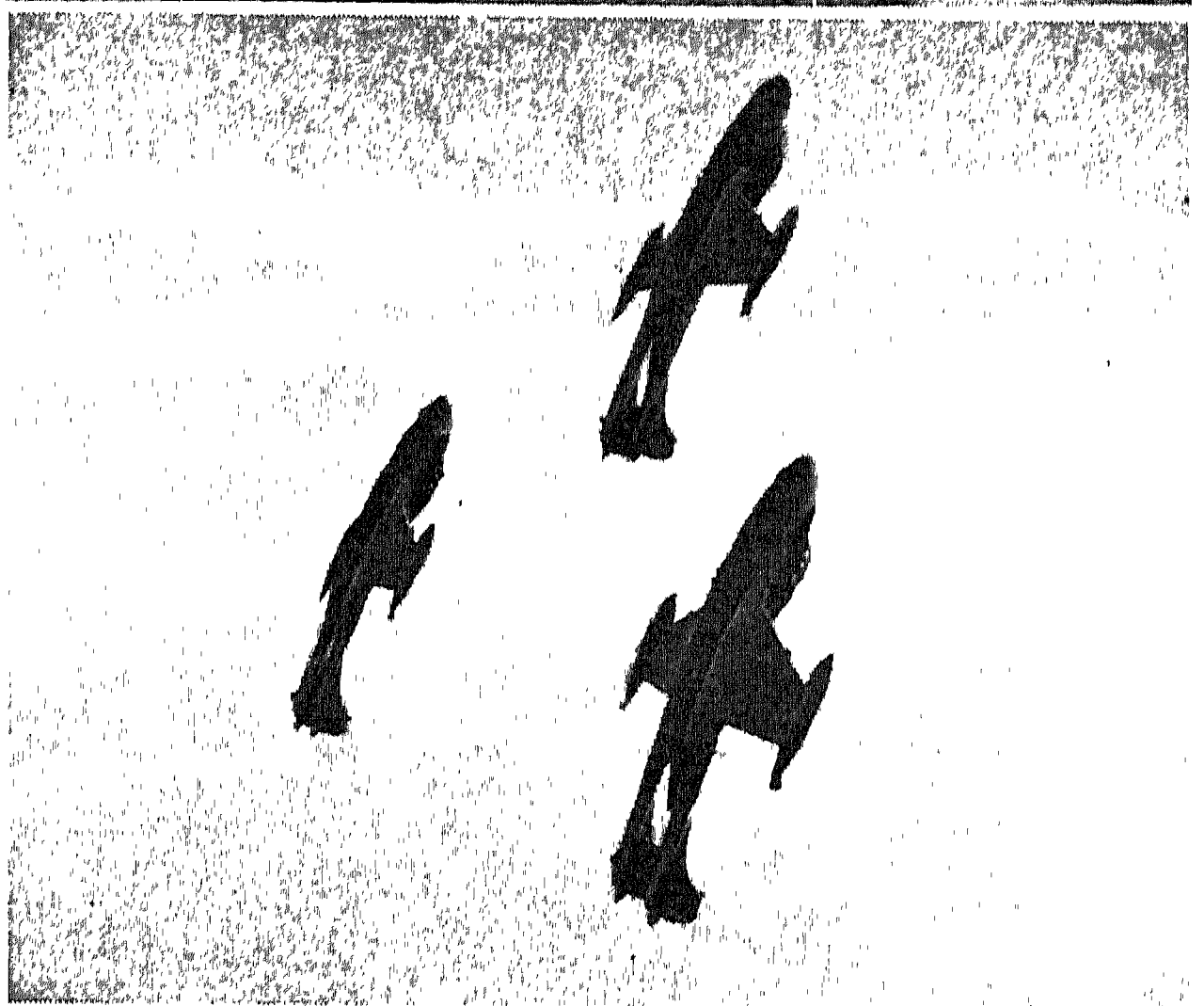
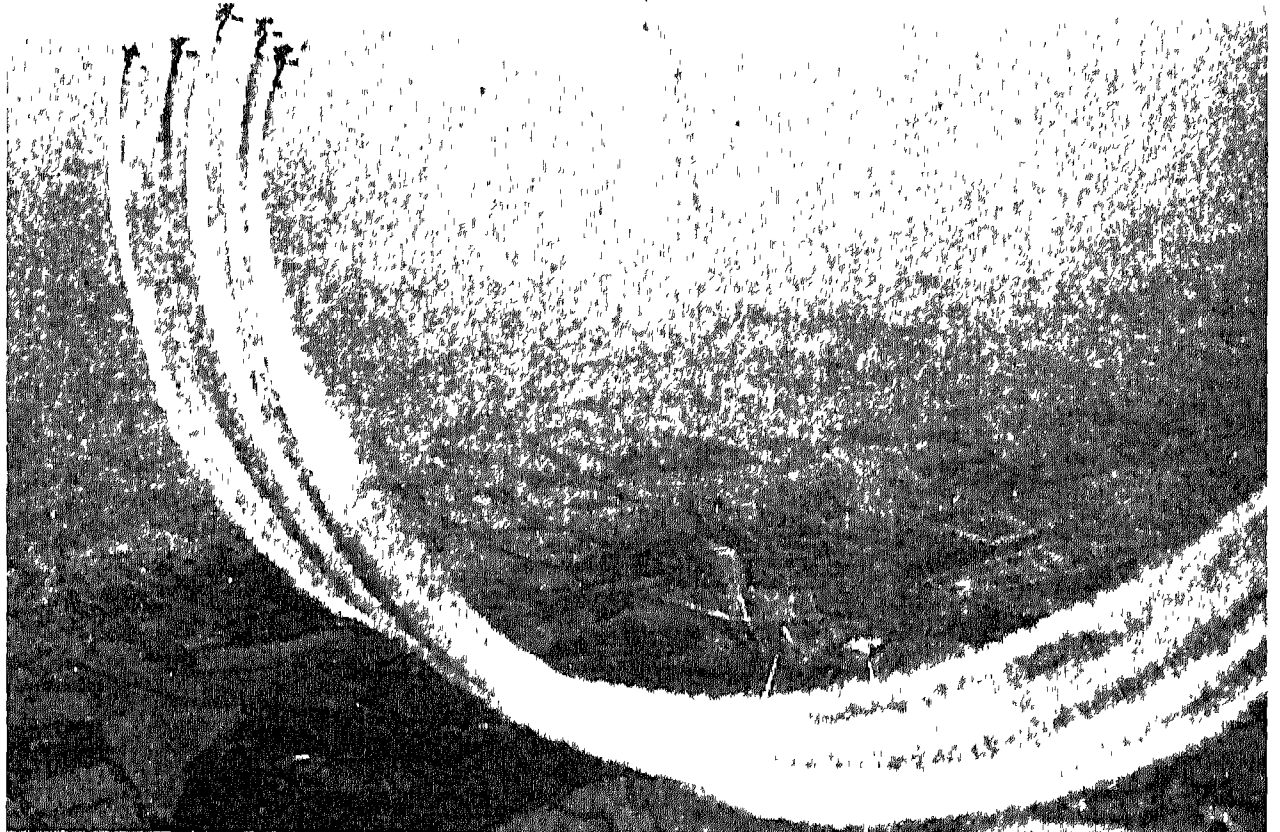
Aerobatics are taught in air forces to instil confidence in the pilot, to help him to acquire a high standard of accuracy in flying, and

to teach him to control his aircraft instinctively when something unforeseen arises. Test pilots use aerobatics in testing.

**Aerobic.** Biological term for respiration in which oxygen is absorbed. It is applied particularly to those micro-organisms requiring oxygen for their growth and multiplication. Anaerobic respiration takes place in the absence of oxygen. The majority of micro-organisms are aerobic, including those which produce diseases in man, but the important fermentation bacteria are anaerobic.

**Aero Club, ROYAL.** Association formed in 1901 as the Aero Club of the United Kingdom, to encourage all branches of aeronautics; it received the royal charter in 1910. From 1905 the club was the sole

representative in the U.K. of the Fédération Aéronautique Internationale, and as such controlled private flying, air-races, and record attempts in the U.K. It organized the first Aerial Derby contest in 1912, won by T. O. M. Sopwith flying a Blériot monoplane with a 70 h.p. Gnome engine at 58.5 m.p.h., the King's Cup air race, from 1922; the annual national air race from 1949. The club, which helped to promote light aeroplane competitions at Lympne after the First Great War, and British flying clubs from 1926, cooperates closely with the British Gliding Association and the Popular Flying Association. The club premises are at 119 Piccadilly, London, W.1; the Aviation Centre, situated at No. 19 Park Lane, London, W.1, was opened



**Aerobatics.** Venom jet-propelled fighters turning over as they reach the top arc of a loop: photographed from another Venom, 1955. Above, a flight of Bristol Bulldogs looping the loop in formation at a R.A.F. display, 1935



# AERONAUTICS: THE SCIENCE OF FLIGHT

David Le Roi

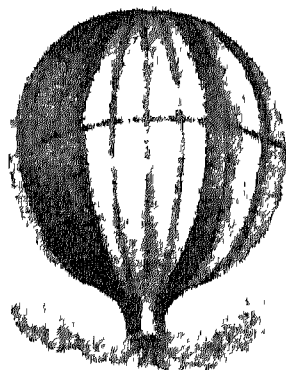
*In this article the development of aerial navigation from its inception is outlined. The varied branches of the subject are dealt with under their respective headings and reference should be made therefore to Aeroplane; Airship; Aviation; Balloon; Flight; individual aircraft, e.g. Rior, Comet; and types of aircraft, e.g. Bomber. Consult also Jet Propulsion; Rocket Propulsion*

Aeronautics (Gr. *aēr*, air; *nautikos*, pertaining to navigation) is the science or art which treats of aerial navigation, and of the design and production of suitable apparatus and machines.

For aerial navigation, in so far as it concerns the flying of an aircraft on a predetermined course, which is merely an adaptation of navigation on land or sea, see Navigation. This survey is concerned with the development of aircraft and the principles by which they become airborne and move through the air.

Aircraft are of two main types: those which are lighter, and those which are heavier, than air. Aircraft lighter than air began with the balloon, the motion of which can be controlled only vertically, and developed into the powered airship, the motion of which can be controlled vertically, horizontally, and laterally. Aircraft heavier than air include the kite and the glider, which have themselves no source of power and move by taking advantage of winds and air currents, and the powered aircraft or aeroplane, which can move in any direction according to the will of its pilot.

The development of these various kinds of aircraft did not follow any fixed sequence; that is, the heavier-than-air machine did not, as would seem logical, evolve from the lighter-than-air balloon; neither did the powered aircraft altogether develop from the glider and kite. Indeed, the practical aeroplane preceded the practical glider. Moreover, and despite the greater simplicity of the principles involved, the balloon did not engage serious attention by experimenters until long after inventors had started trying to achieve powered flight with the heavier-than-air aeroplane.



Montgolfiers' first hot-air balloon, June 5, 1783. It carried no passenger

**LIGHTER-THAN-AIR CRAFT.** The first authentic reference to lighter-than-air machines occurs in the writings of Roger Bacon (c. 1214-1294). Bacon believed that air was a fluid like water with an upper surface like that of the sea, and that on this surface an airship would float once it had risen to the necessary height. He suggested that the surface of this aerial sea could be reached by means of metal globes filled with what he called liquid fire. It is

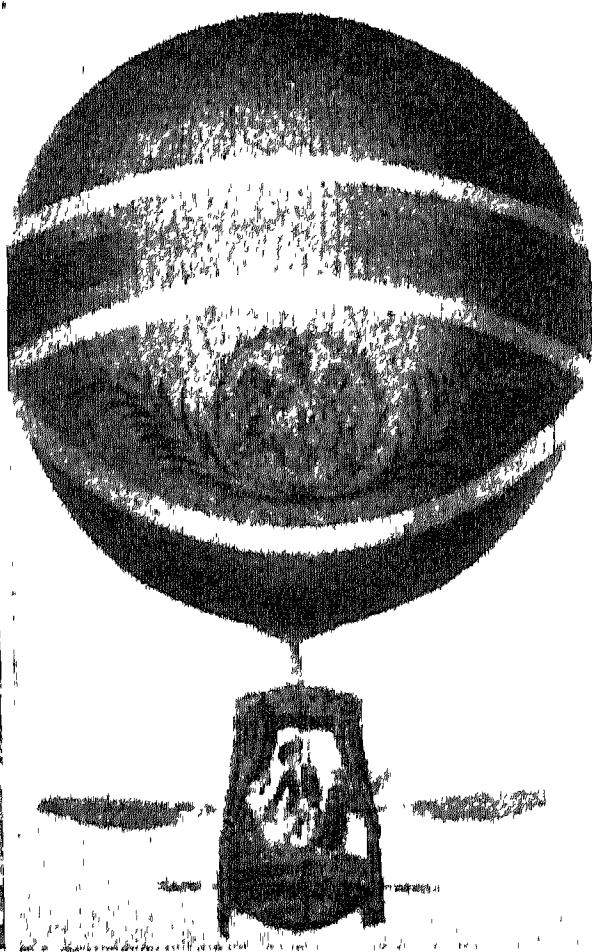
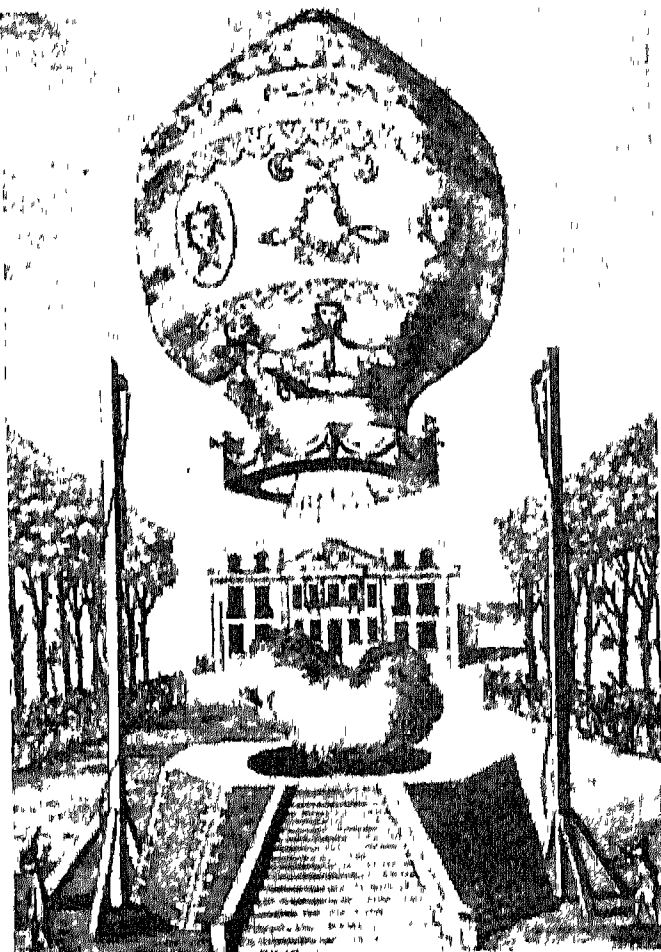
probable he had in mind smoke or some gas lighter than air; if so he had hit on the idea that makes ballooning possible.

Leonardo da Vinci (1452-1519) and Francesco de Lana (1631-1687) suggested that an aerial vehicle could be made consisting of a canvas box suspended from hollow silver balls from which the air had been extracted. Leonardo and de Lana appreciated that for anything to float in the air it must be lighter than the air, and that as the balls would be emptied of air their interiors would therefore be lighter than the atmosphere outside them. But neither seems to have realized that the metal forming the balls would be many times heavier than the air extracted from them.

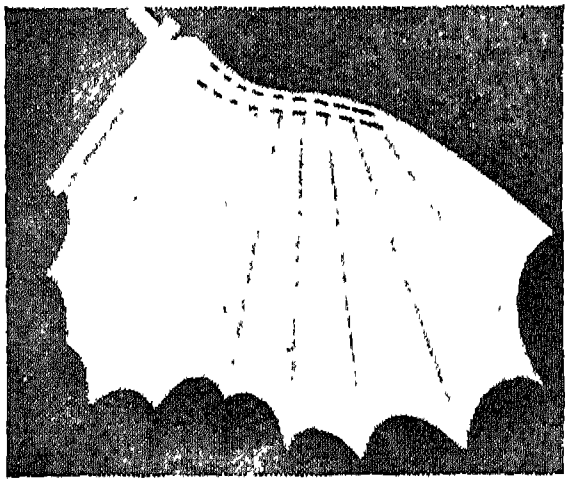
Equally impracticable suggestions were made by later experimenters, until in 1766 Henry Cavendish (1731-1810) published his estimate of the weight of hydrogen. Hydrogen is much lighter than air, and in 1767 Joseph Black (1728-1799) made a silk balloon; but it was too heavy to be lifted by the amount of hydrogen that could be got into it. Similar unsuccessful experiments were made with paper bags by Tiberio Cavallo (1749-1809), an Italian chemist; but in 1782 he inflated soap bubbles with hydrogen: they floated upwards until they burst.

He later tried inflating small silk balloons with hydrogen to make them airborne but, like Black, he was unsuccessful.

Meantime the brothers Étienne, or Stephen, (1745-1799), and Joseph (1740-1810) Montgolfier, who owned a paper factory at Lyons, had discovered that by inflating a paper bag with hot air it would rise. They argued that if a paper bag could be filled with a cloud-like substance, such as smoke, it would float.



Aeronautics. Left: first free ascent of passenger-carrying balloon, Paris, Nov. 21, 1783. Right: Vincent Lunardi's ascent from London in a hydrogen balloon, Sept. 15, 1784



**Aeronautics.** Bird-like wing for attaching to framework of da Vinci's flying machine. The wing is of silk arranged in panels to simulate feathers and stretched over wire-strengthened bamboo

killed. In 1884 Charles Renard built an electrically-driven airship. The envelope was circular in section and of true streamline form. It had a bulbous nose and, widening to its greatest circumference at approximately one-third of its length, tapered to a blunt tail. The envelope had a capacity of 66,000 cubic feet.

Further developments were made by Santos-Dumont (1873-1932), who constructed numerous small airships during 1898-1906. In 1897 the first rigid airship was built by an Austrian engineer named Schwartz; the envelope was of sheet aluminium over a metal framework. Schwartz's airship was not a success; but it was the direct ancestor of the Zeppelin. With the Zeppelin the airship became a practicable vehicle for transport and travel by air.

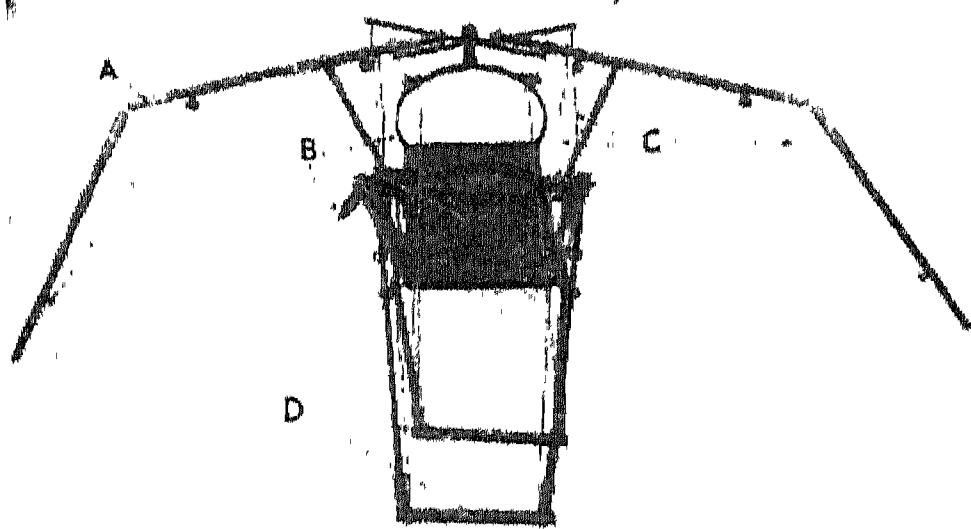
**HEAVIER - THAN - AIR CRAFT.** Strictly speaking, the powered heavier-than-air craft, or aeroplane, is the true flying machine, as the lighter-than-air craft only floats and does not fly. A bird is heavier than air and flies by virtue of flapping its wings. Hence it is not surprising that the earliest experimenters in aeronautics tended to ignore lighter-than-air craft and devoted their energies to devising machines that would provide man with mechanical wings. In all ages and civilizations attempts have been made to achieve human flight with wings; and it is an indication of the importance attached to that ambition that most of the supernatural beings conceived of man's imagination—the gods, the angels, the genii, the fairies, the witches—have had the power of transporting themselves through the air by magic or by winged flight.

There is the Persian tale of the magic carpet, and in Greek mythology the story of Daedalus and his son Icarus. Daedalus and Icarus were imprisoned in a maze in Crete and in order that they might escape, Daedalus made wings of feathers which he and his son fastened to their shoulders with wax. Daedalus flew safely away to Sicily, but Icarus flew too near the sun, the wax holding his wings melted, and he fell into the sea and was drowned. In England there was the legendary King Bladud, who is said to have built the city of Bath. Bladud was also a magician, and made himself a pair of wings with which he flew to London; but when he tried to land he fell to the ground and was killed.

From fables men turned to practical experiments and, taking birds as their models, built an endless succession of strange machines with flapping wings. One of the earliest experimenters was the English Benedictine monk Oliver of Malmesbury. According to a contemporary account, Oliver's flying machine consisted of a pair of wings strapped to his body, with a kind of tailplane or rudder fixed to his heels. The wings were made of thin wood covered with linen and were to be flapped by movements of the wearer's arms and legs. Oliver made his trial flight in 1020 when, wearing his wings, he jumped from the tower of Malmesbury Abbey. He began to glide to

Two hundred years later Albertus Magnus (c. 1200-1280) wrote a long MS. on the theory of flight based on his observations of birds and flying insects. About the same time Roger Bacon (c. 1214-1292) wrote prophetic descriptions of aeroplanes which, he predicted, would in the future carry travellers to any part of the world at a speed of 100 miles an hour. But no one took him seriously.

Leonardo da Vinci (1452-1519) made a model helicopter (*q.v.*) which actually worked. He also wrote essays on the basic principles of flight which modern aeroplane designers have found to be per-

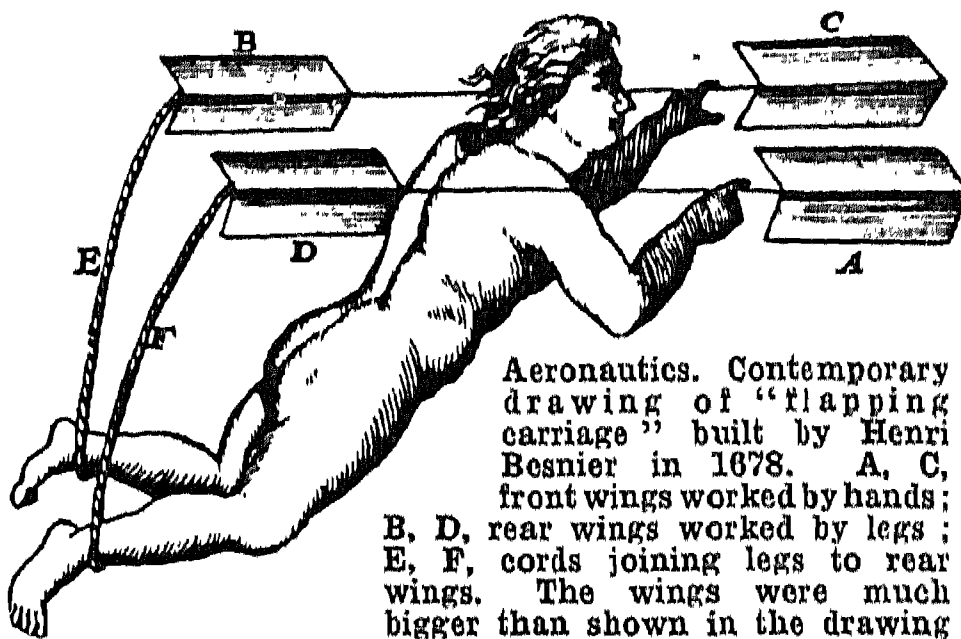


*Crown Copyright: Science Museum*

**Aeronautics.** Model of the framework of a flying machine built according to plans drawn by Leonardo da Vinci. A, hinged spar; B, frame supporting "pilot's" body; C, cords to work the flapping wings; D, bars attached to wing frames and worked by "pilot's" feet

fectly sound. Louis XIV of France was interested in the possibility of the flying machine as a military weapon, and in 1660 paid for the building of a flying machine designed by Jules Allard, a Paris acrobat. Allard's machine consisted of a bamboo framework covered with canvas, and had two large canvas wings, strapped to the arms and legs, which were to be flapped like those of a bird. Allard attempted his first flight by gliding from a specially-built tower in Visinet Forest, near Paris, but he lost control of his machine and was killed. Equally unsuccessful was an attempt to flap wings by clockwork.

In 1678, Henri Besnier, a French locksmith, constructed what he called a "flapping carriage." This consisted of two long wooden poles at the ends of which were hinged muslin wings stretched

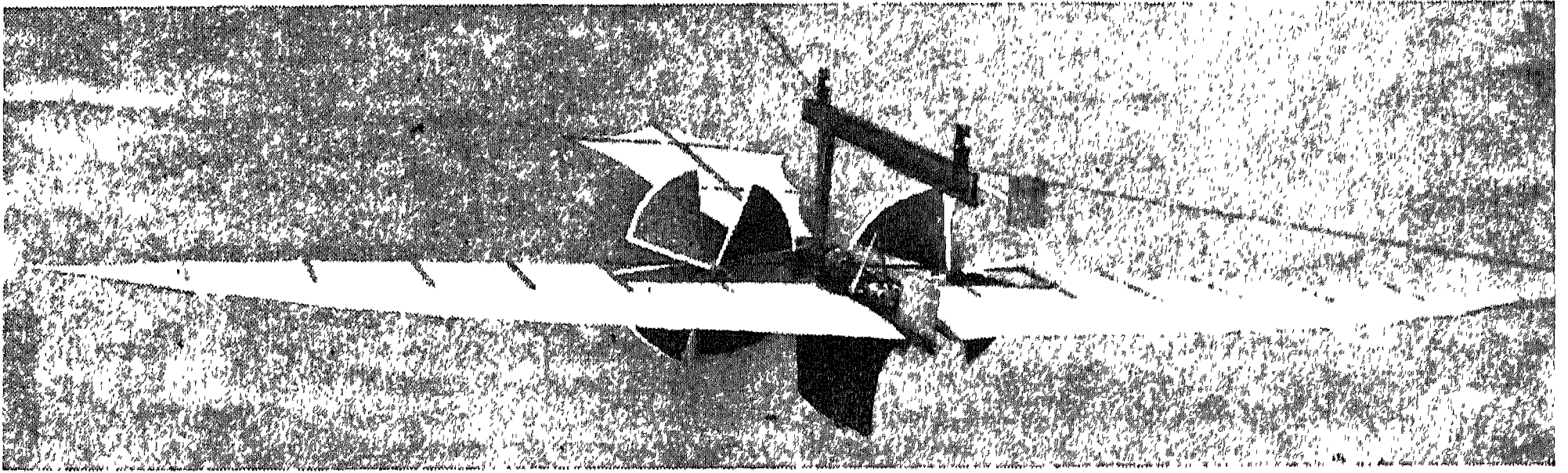


**Aeronautics.** Contemporary drawing of "flapping carriage" built by Henri Besnier in 1678. A, C, front wings worked by hands; B, D, rear wings worked by legs; E, F, cords joining legs to rear wings. The wings were much bigger than shown in the drawing

over thin wooden frames. A pole was placed across each shoulder of the man operating the machine, and cords were attached to the feet to control the flapping of

earth and all went well until he tried to turn in the air; then a sudden gust of wind threw him off his balance and he fell to earth, breaking his legs.





*Crown Copyright: Science Museum*

**Aeronautics.** Steam-driven model aeroplane built and flown by John Stringfellow in 1848. The machine was attached to a carriage running along a wire for take-off; when the end of the wire was reached the aeroplane parted from the carriage and became airborne—the first engine-driven aeroplane to fly

a suitable engine was designed, a man-carrying aeroplane could, and would, be built.

Amongst the few people who appreciated Cayley's experiments with model gliders was William Henson (1805–1888). In 1842 he designed a monoplane having a wing of oiled silk stretched over a bamboo frame. Behind the wing were two large double-bladed propellers, to be driven by a steam engine of 250 h.p. The aeroplane was to be steered by a fan-shaped tail or rudder, and he adopted Cayley's tailplane to keep the machine in level flight. The aeroplane had a long fuselage below the wing and two landing wheels and a tail skid. With the help of another engineer, John Stringfellow (1799–1883), Henson built a working model. The propellers were driven by a light, powerful steam engine. But the aeroplane would not rise off the ground: the engine was too heavy.

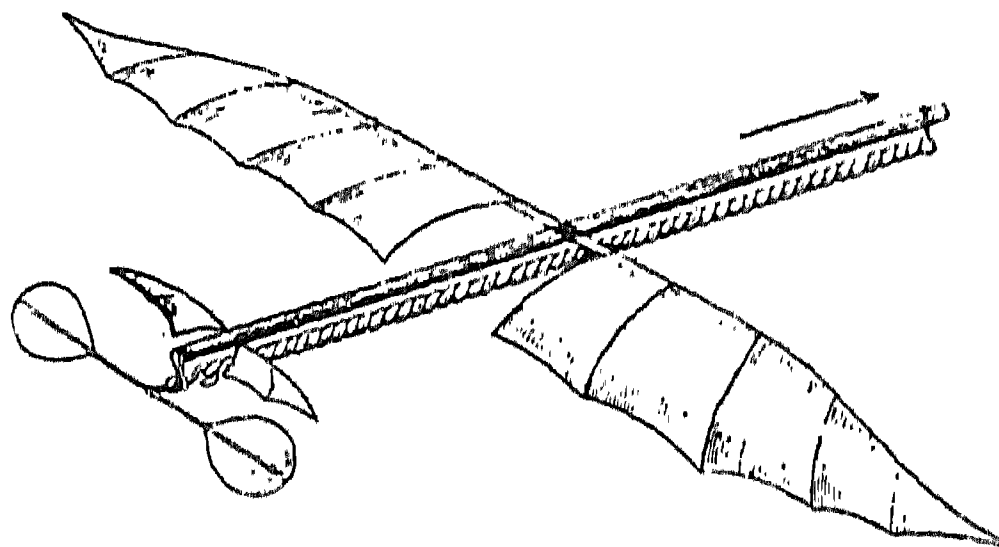
Disheartened by this failure, Henson emigrated to the U.S.A., where he spent the rest of his life. But the plans of his machine are very like those of the later monoplane, while the description of its construction contains details of all the chief parts used in propeller-driven aeroplanes in the mid-20th century.

Stringfellow continued to experiment, and in 1848 he built a model which was the first engine-driven aeroplane to fly. It was a monoplane with a wing span of 10 feet, and had two propellers, one on each side of the fuselage, driven in opposite directions by a rubber band from a centrally placed steam engine running on methylated spirit. The model, with water and fuel for the engine, weighed about 8½ lb.

Stringfellow first flew his model in the long shed of a lace factory at Chard, Somerset. When steam had been raised in the boiler and

the engine was turning the propellers at full speed, the little aeroplane was started along a sloping wire extending for half the length of the shed. When it reached the end of the wire, the model flew off under its own power and gradually rose in the air to travel forward until it struck the canvas screen at the end of the shed. In 1868 Stringfellow made a power-driven model triplane which won him a prize of £100.

But Stringfellow's machines were always liable to topple sideways or



**Aeronautics.** Model with which Alphonse Penaud experimented to achieve lateral and horizontal stability of an aircraft in flight. The pusher-propeller was driven by twisted elastic. A later model on the same principles but driven by compressed air was made by Jules Tatin

to make a sudden dive to earth. This was because he had not found the correct angles for placing the wings and positioning the fin and rudder. Sir George Cayley had shown the best method of fixing wings and tailplanes on his gliders, but none of his gliders was power-driven. A stream of air from a propeller has rather a different effect on wings from that of the comparatively gentle airstream met by a glider floating through the air. Consequently many adjustments had to be made and much research carried out before anyone evolved a power-driven flying machine built on aerodynamic lines that was both stable and controllable when airborne.

A Frenchman, Alphonse Penaud (1850–1880), made the first model aeroplane to fly without wobbling from side to side or suddenly nose-diving to the ground. His model, which first flew in 1870, consisted of a thin piece of wood 3 ft. long which served as fuselage, with a wing 2½ ft. wide fixed slightly in front of the centre of the wood. At the end of the wood a tailplane was fixed. Behind the wing was a two-bladed propeller driven by twisted elastic. Penaud secured lateral stability by bending the tip

of the wing slightly upwards, so that the roots or base of the wings joined the fuselage at an angle like a very wide V. This arrangement, called dihedral, although somewhat modified, became normal practice in aeronautics. (*See drag, opposite*).

Joining the wings to the fuselage at an angle stops the aeroplane from swaying from side to side. If the aeroplane tips to one side, the end of the wing forced down on that side presses against the air underneath it. This increases the pressure of the air, which immediately forces the tip of the wing up again.

Penaud achieved longitudinal balance by bending the tailplane upwards. When the nose of the aeroplane tried to tip downwards, the tail was forced up and pressed against the air above it. This had the effect of compressing the air, which then forced itself against the tailplane and pushed it downwards until the bottom of the tailplane was again pressing against the

As the propeller turns, the air around it is compressed to a higher pressure, and therefore becomes "solid" enough for the propeller blades to grip it. Some aeroplane propellers are behind the wing, when their screw effect pushes the aeroplane forward, but the result is the same.

For any given type of propeller-driven aircraft, a certain speed of the airscrew is sufficient to produce a strong enough stream of air under the wing to prevent the aeroplane from falling to the ground. If the propeller turns too slowly, the airstream under the wing will not be strong enough to hold up the wing, and the machine will quickly lose height. If the propeller stops, there will not be any stream of air under the wing, and the force of gravity will then pull the aeroplane to the ground, and the pilot will have to glide his machine to earth. This is easy, provided the aeroplane is kept balanced on its centre of gravity.

If the propeller is made to go so fast that the airstream it forces under the wings is more than enough to prevent the aeroplane from losing height, the extra strength of the stream of air under the wing will force the wing upwards, causing the aeroplane to climb. But to go faster, even if he does not want to climb higher, the pilot must still increase the speed of the propeller, which then screws faster through the air. Increased speed without increased height can be obtained by operating a device called the elevator, which forces the nose of the aeroplane down as it tries to climb, so compelling the aeroplane to fly straight although its speed is increasing. (For the adaptation involved in jet-propelled flight see Jet Propulsion.)

There are three main controls on an aeroplane; the rudder, the elevators, and the ailerons. These are supplemented by auxiliary trimming surfaces called tabs.

The fuselage of the aeroplane is continued backwards almost to a point, where there is mounted an upright fixed fin. This keeps the aircraft from swaying from side to side. The end of the fin is hinged to form a rudder which can be



*Crown Copyright: Science Museum*

**Aeronautics.** Ornithopter, or flapping wing machine, built as an experiment in 1902. The wings consisted of feathers attached to silk stretched over a light framework. A 3 h.p. petrol engine flapped the wings one hundred times a minute

moved from left to right like the rudder of a boat. Attached to each side of the rudder is a length of wire or rod; these wires or rods are led through the fuselage and fixed to each end of the rudder bar against which the pilot rests his feet. The pilot moves the rudder by pushing one foot or the other against the bar, so pulling the rudder to the right or to the left.

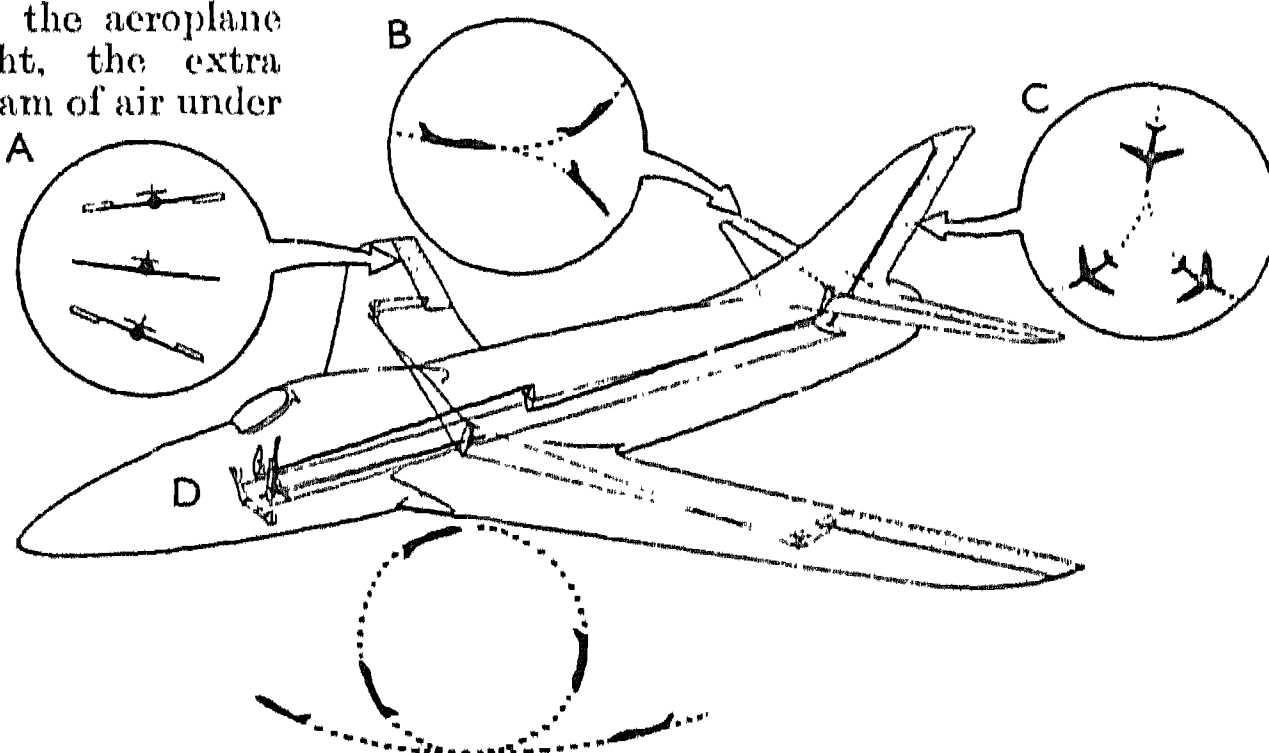
Because an aeroplane travels very fast, sudden turning of the rudder might tear the rudder and fin from the fuselage. So the rudder is assisted by making the

planes the process and turns the whole aircraft to the left. When these operations are reversed, the aeroplane turns to the right. With control column upright and rudder bar level, the aeroplane flies itself on a level course, the pilot merely having to use the rudder to control lateral movement.

Climbing and diving are assisted by the elevators. These are two flat surfaces hinged to the rear edges of the tailplane, one on each side of the fin, and connected to the control column. Moving the control column to the rear pushes up the elevators, whereupon the air presses down against the upper surfaces of the elevators, so forcing the tail down. The nose of the aeroplane tilts up, and the machine begins to climb. To reduce altitude, the control column is pushed forward, so turning the elevators down; the tail now rises, the nose dips, and the aeroplane glides earthwards. Some large aeroplanes have two or more sets of fins, rudders, and elevators, all in line and worked mechanically.

It is safest to land an aeroplane at a slow speed. To reduce speed when coming in to land, the pilot pulls a lever causing a hinged flap in each wing to turn down and thus offer strong resistance to the air rushing past the aircraft, so slowing its gliding speed. Speed is also reduced by landing against the prevailing wind.

**Bibliography.** The Theory of Flight, O. G. Sutton, 1949; The Biology of Flight, Fitzpatrick and Stiles, 1944; Aviation, M. E. Wimperis, 1945; Aeroplane Structures, Miles and Nowell, 1954; Mechanics of Flight, A. C. Kennmore, 1955.

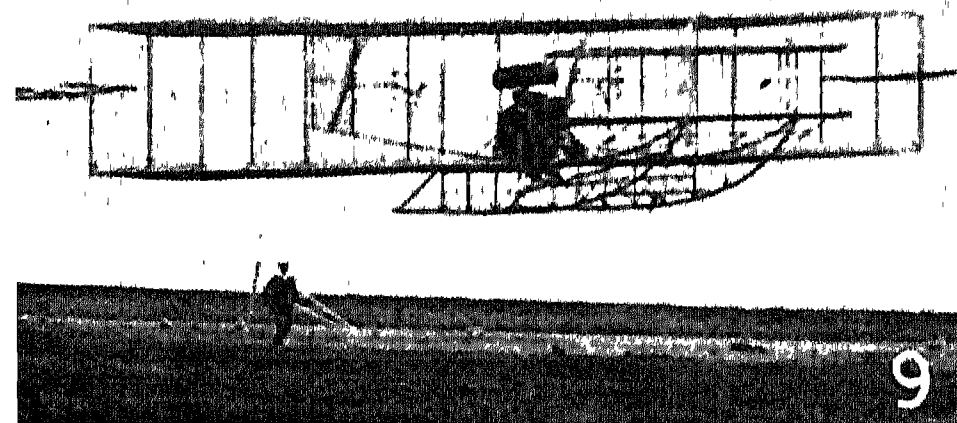
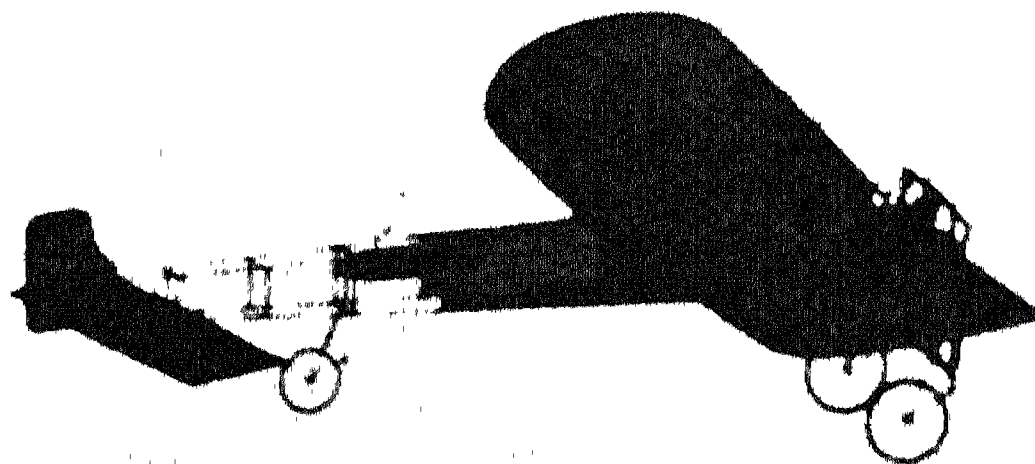
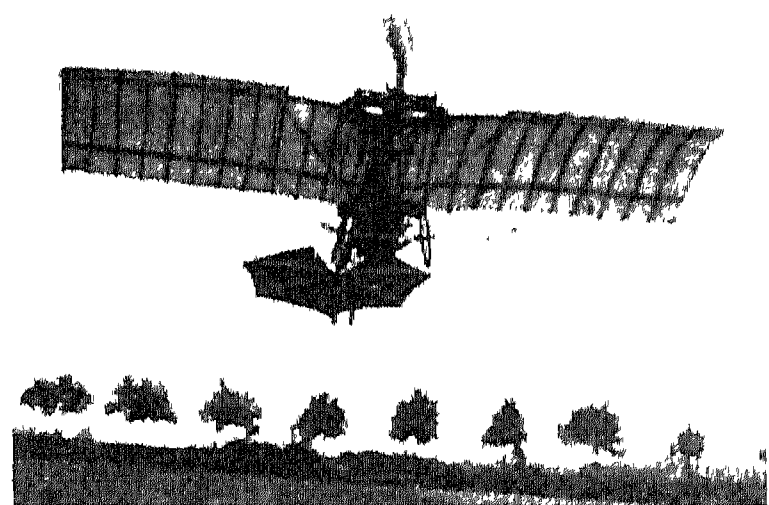
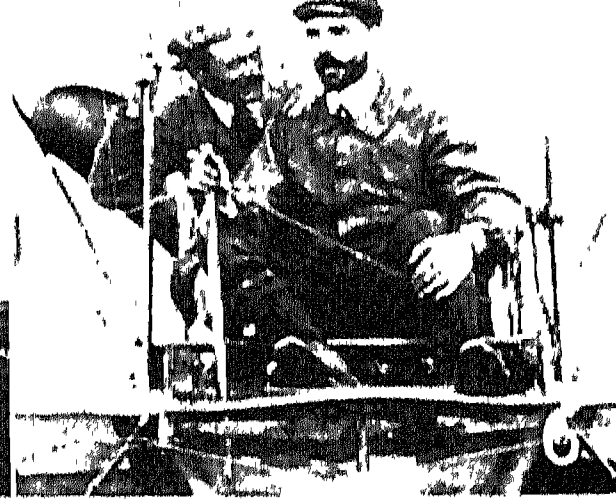
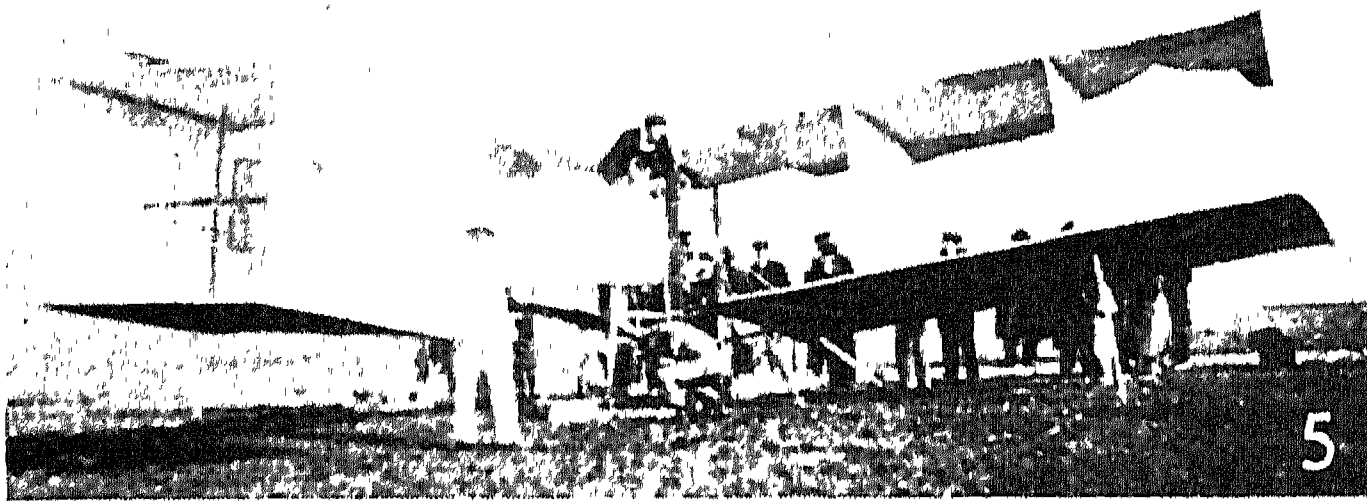
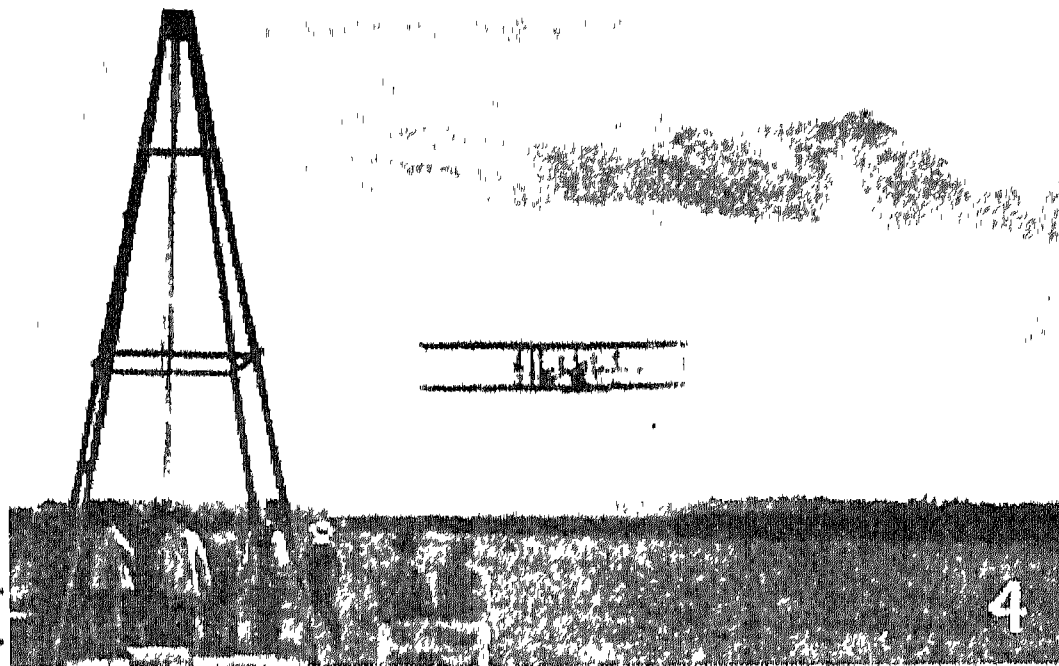
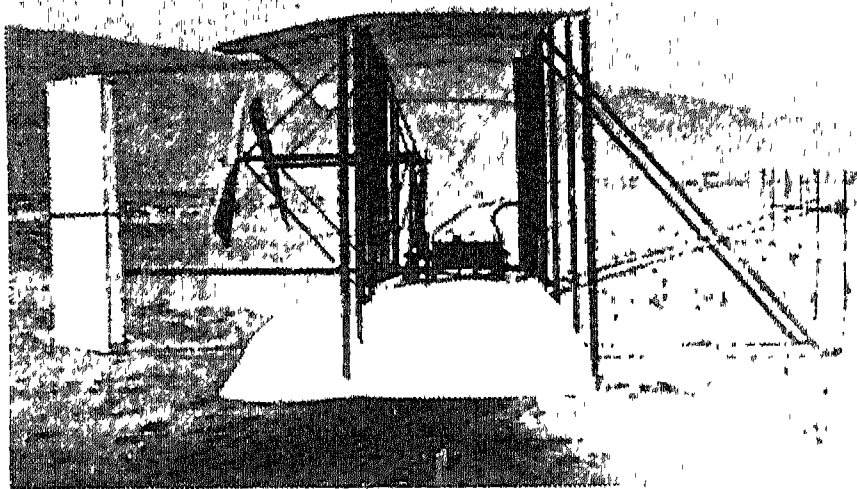
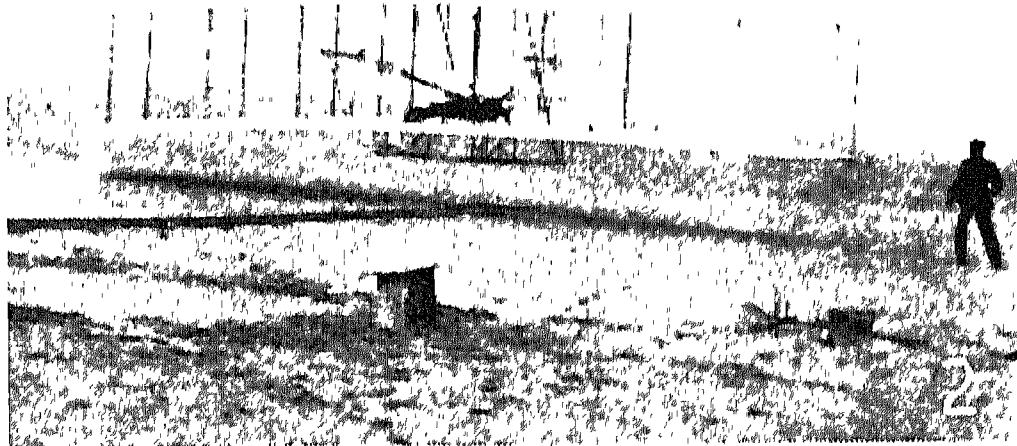
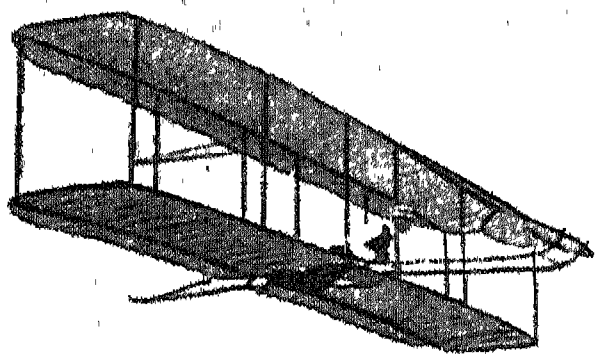


**Aeronautics.** Aeroplane control surfaces: A, aileron. B, elevator. C, rudder. D, control column and rudder bar. The circled drawings show the direction and motion given to the aircraft when the appropriate surfaces are moved. See text in this and facing pages

aeroplane bank, just as a cyclist leans over when pedalling at speed round a bend on a road. On the rear, or trailing edge, of each wing there is a hinged flap called an aileron, and the ailerons are connected to the pilot's control column, which can be moved backwards or forwards or from side to side.

Movement of the control column to the left raises the left aileron and lowers the right one. Air pressure then forces the right wing up and the left wing down. The aeroplane then leans or banks over to the left, while at the same time the pilot pushes the rudder bar forward with his left foot, so pulling the rudder to the left, which com-



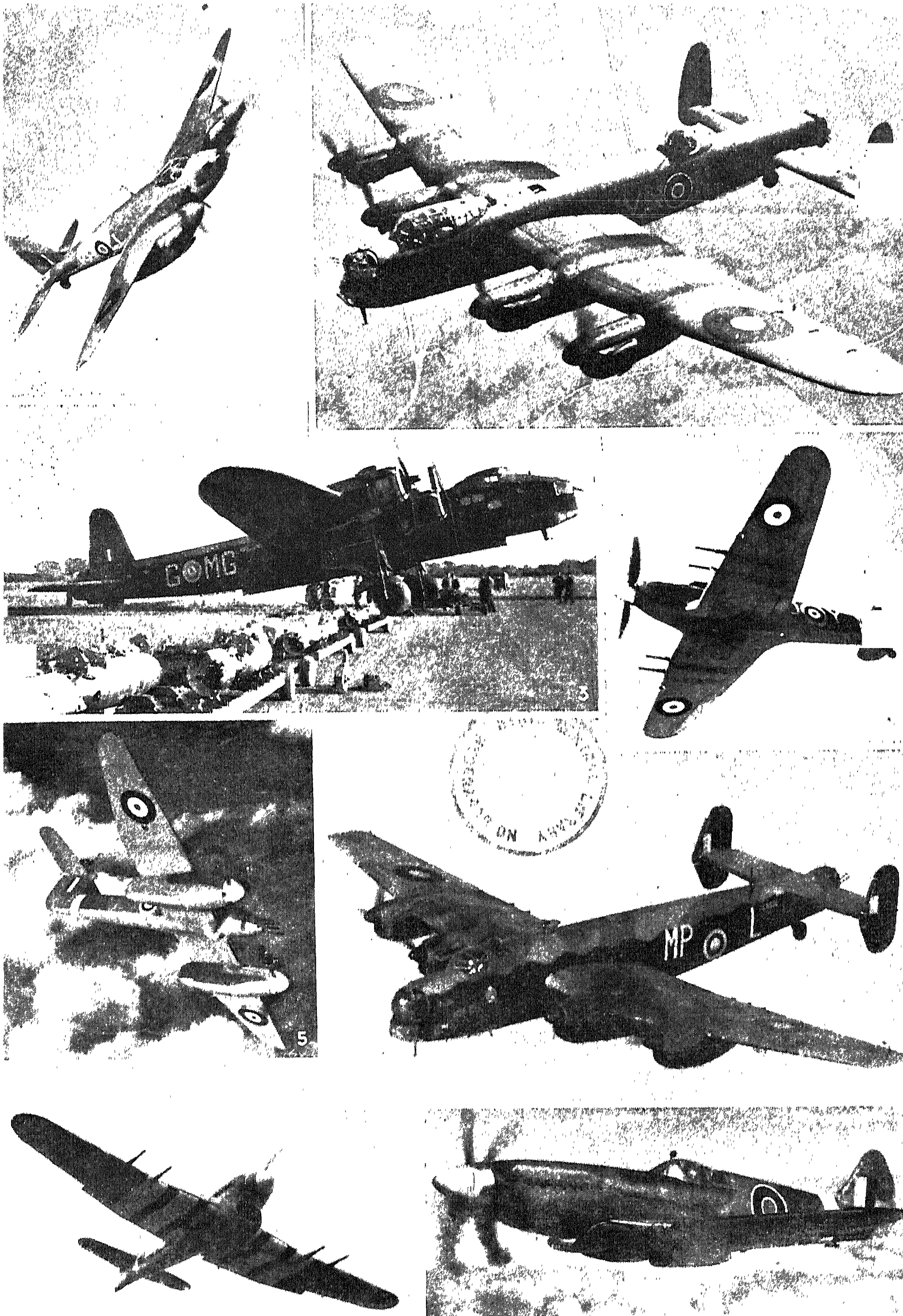


1. One of the Wright brothers airborne on a glider, 1902. 2. Orville Wright making the first flight on a powered aircraft, 1903. 3. The Wrights' first aeroplane. 4. Wilbur Wright completing a record flight of 50 miles, 1908. 5. Santos-Dumont's biplane of 1906. 6. Henry Farman at the controls of the aeroplane in which he made

the first 100-mile flight, 1909. 7. Santos-Dumont flying his first monoplane, 1909. 8. Louis Blériot making the first aeroplane flight across the English Channel, July 25, 1909. 9. J. T. C. Moore Brabazon taking off in a Short-Wright biplane, 1909. 10. Claude Grahame-White competing in the race from London to Manchester, 1910

# AEROPLANE : AIRMEN OF 1902-1910 AND THEIR HISTORIC ACHIEVEMENTS





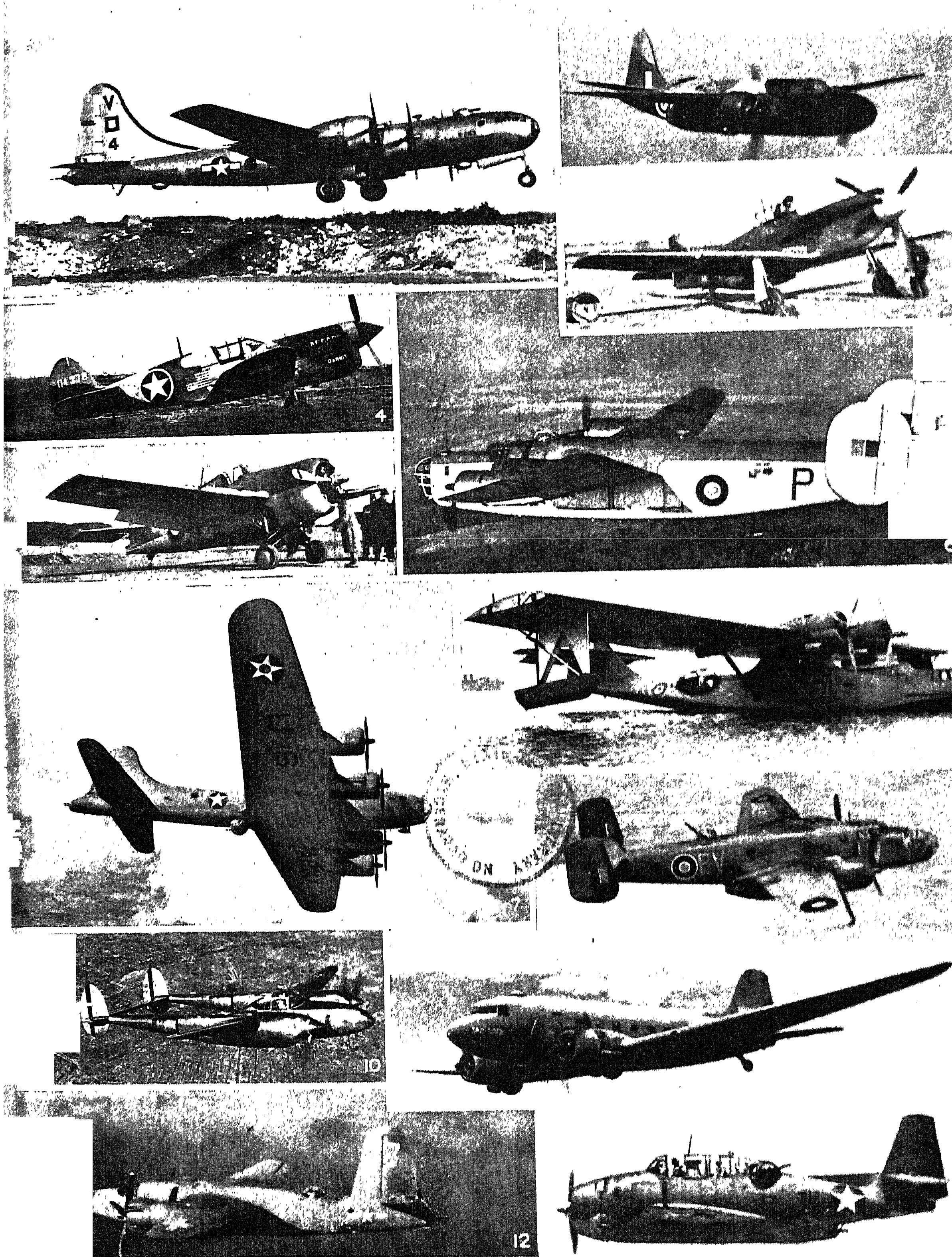
1. De Havilland Mosquito IV reconnaissance bomber.  
2. Avro Lancaster; note underslung engine nacelles.  
3. Bombing up a Short Stirling. 4. Hawker Hurricane  
fighter, which carried four 20 mm. cannon. 5. Westland  
Whirlwind day and night fighter. 6. Handley Page Halifax

bomber, with four machine-guns in nose and tail turret.  
7. Hawker Typhoon, high-speed fighter with Napier  
Sabre engine and four cannon. 8. Vickers Supermarine  
Spitfire XIV, high-altitude fighter equipped with a two-  
speed, two-stage supercharged Rolls Royce Griffon engine

#### **AEROPLANE: FAMOUS BOMBERS AND FIGHTERS USED BY THE R.A.F. IN THE SECOND GREAT WAR**

*Photos 1, Charles H. Brown; 2, Barratt's; 3, "Wide World"; 4, 6, and 8, British Official; 5, "Flight"; 7, Associated Press*





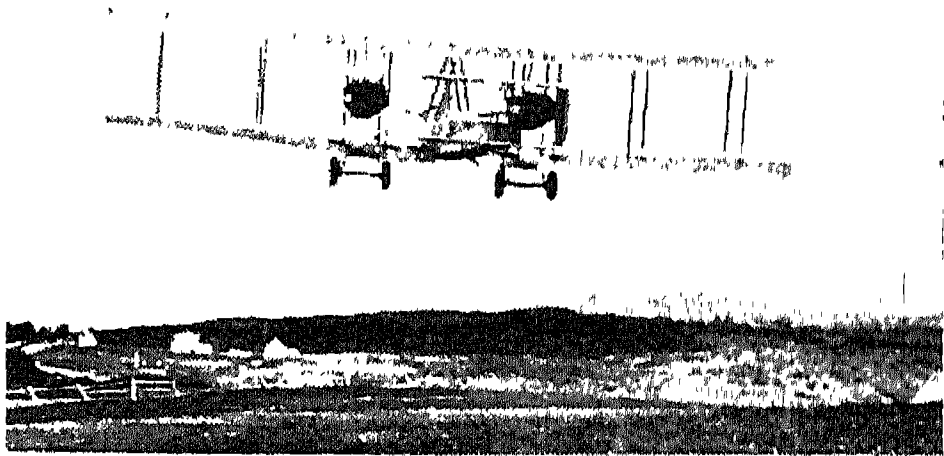
1. Boeing Superfortress, which carried a greater bomb load farther, faster, and higher than any other machine. 2. Douglas Havoc night fighter. 3. N. American Mustang fighter. 4. Curtiss Kittyhawk II fighter. 5. Grumman Wildcat carrier-borne fighter. 6. Consolidated Liberator

heavy bomber. 7. Boeing Flying Fortress bomber. 8. Consolidated Catalina flying boat, bomber. 9. N. American Mitchell bomber. 10. Lockheed Lightning fighter. 11. Douglas Dakota transport. 12. Martin Marauder bomber. 13. Grumman Avenger torpedo bomber

#### AEROPLANE: AMERICAN FIGHTING MACHINES PROMINENT IN THE SECOND GREAT WAR

Photos, 1 and 9, Planet News; 2, 6, and 8, British Official; 3, Associated Press; 4, 5, 11, 12, and 13, U.S. Official; 7, Boeing Aircraft Co.; 10, Central Press





Aeroplanes. Vickers Vimy bomber taking off from St. Johns, Newfoundland, at the start of the first east-to-west aeroplane crossing of the Atlantic, June 14-15, 1919

carrying power over long distances. At the end of the war, in 1918, the Royal Air Force had in service fighters flying regularly at more than 150 m.p.h., and twin-engined bombers that could carry 2,000 lb. of bombs nearly 800 miles at 100 m.p.h.

Immediately the First Great War ended, nearly every country set about applying military experience to civil aviation. The transport aeroplanes of the early post-war period were all converted from military designs. The first London-Paris air service, Aug. 25, 1919, was by a converted De Havilland bomber; the first direct crossing of the Atlantic by air, June 14-15, 1919, was by a Vimy bomber, as was the first England-Australia flight, Nov. 11-Dec. 10, 1919. The Vimy Rolls, another military aircraft, made the first England-South Africa flights and the first England-India air journey, Jan., 1919, was by a Handley-Page bomber.

The specialised demands of civil aviation led to the introduction of aeroplanes having greater comfort and lower petrol consumption. Among the first aeroplanes designed for civil air transport was the Bristol Pullman triplane. Thereafter the ruling tendency was to build large, but not always fast, aircraft with a good range of flight and comfortable accommodation for passengers.

One of the most striking advances in commercial aircraft design was the Handley Page airliner of the Heracles type which Imperial Airways put into operation on the cross-channel and main European routes in 1931. These machines were powered by four engines each developing 555 h.p. to give a cruising speed of 120 m.p.h. They carried a crew of four and could accommodate 38 passengers. About the same time the Scipio flying boat was introduced to maintain the Mediterranean links of the Empire air

routes. This machine weighed 14 tons fully loaded and could carry 16 passengers and a crew of five. The four engines developed more than 2,000 h.p. to give a maximum speed of 100 m.p.h.

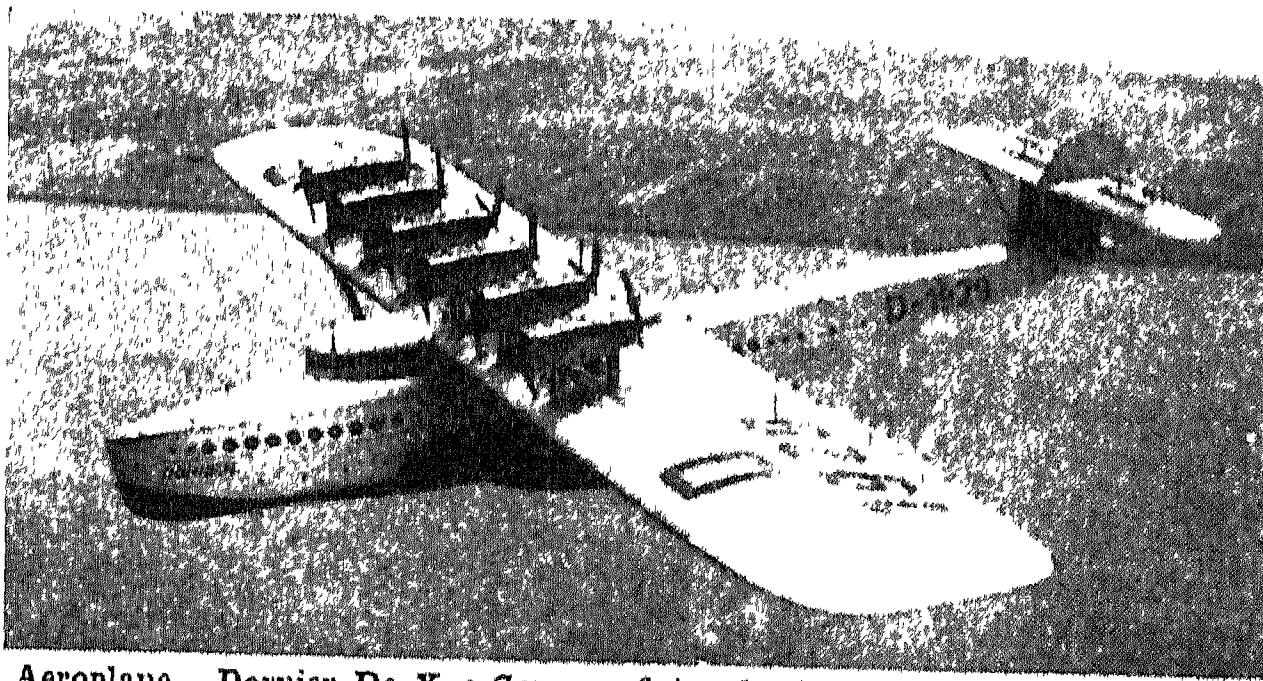
All these were biplanes and differed little from the machines of 1909-10 except that they were bigger, and had more comfortable fuselages, stronger wings, and more powerful engines. The Handley-Page Heracles was anything but a graceful aircraft: with its huge wings braced by a mass of wire and metal struts, it lacked completely the clean lines later associated with aircraft speed. Wood still had a prominent place in even large airliners, while the fuselages of smaller aeroplanes were often a wooden framework covered with canvas or other fabric.

Late in the 1920s aircraft designers began a close study of aerodynamics, or streamlining.

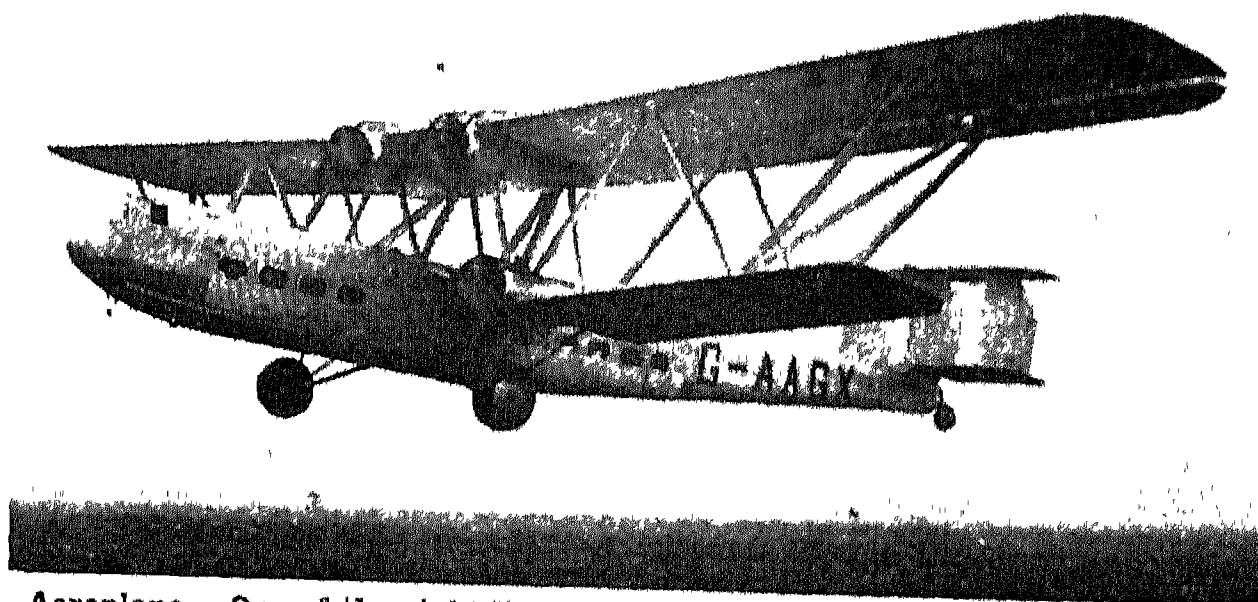
This showed that the aeroplane body and wings should have as few projections as possible so that as the aircraft moved forward air resistance was reduced to a minimum. The monoplane offers much less resistance to the air than does a biplane, and it was then discovered that an aeroplane with single wings was actually more stable and airworthy than was a biplane. Designers next turned attention to the undercarriage, which offered an enormous amount of resistance and got rid of that drag on speed by folding the landing wheels into the wings or engine nacelles during flight.

By 1934 the monoplane with retractable undercarriage was displacing the biplane for airline operation. One of the most successful was the American Douglas DC-2 Transport, an all-metal low-wing monoplane powered by two 710 h.p. engines which carried 14 passengers and a crew of three at a top speed of 215 m.p.h. Because of its luxury cabin it was called the "flying hotel."

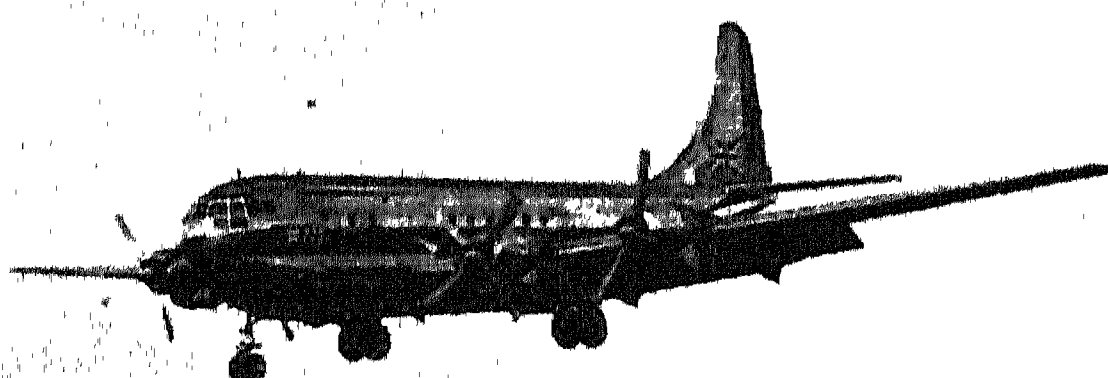
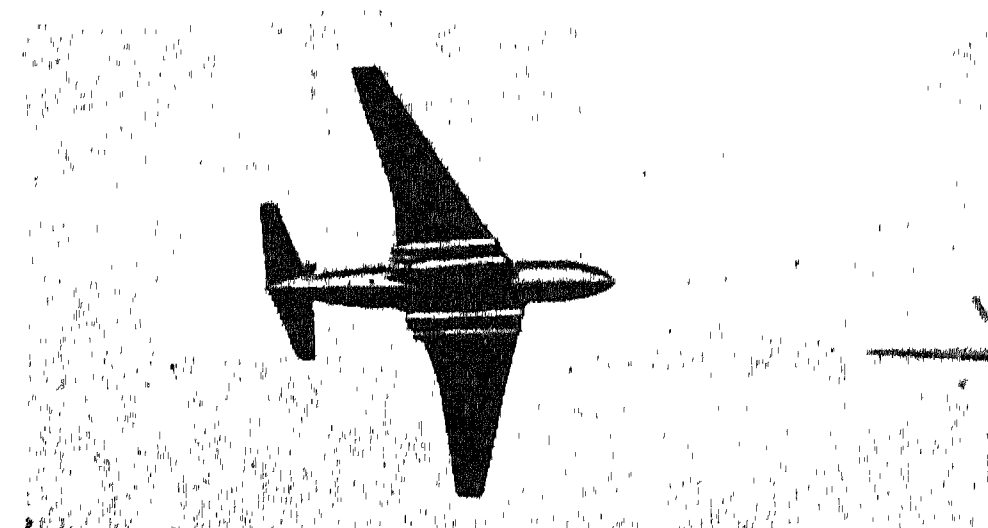
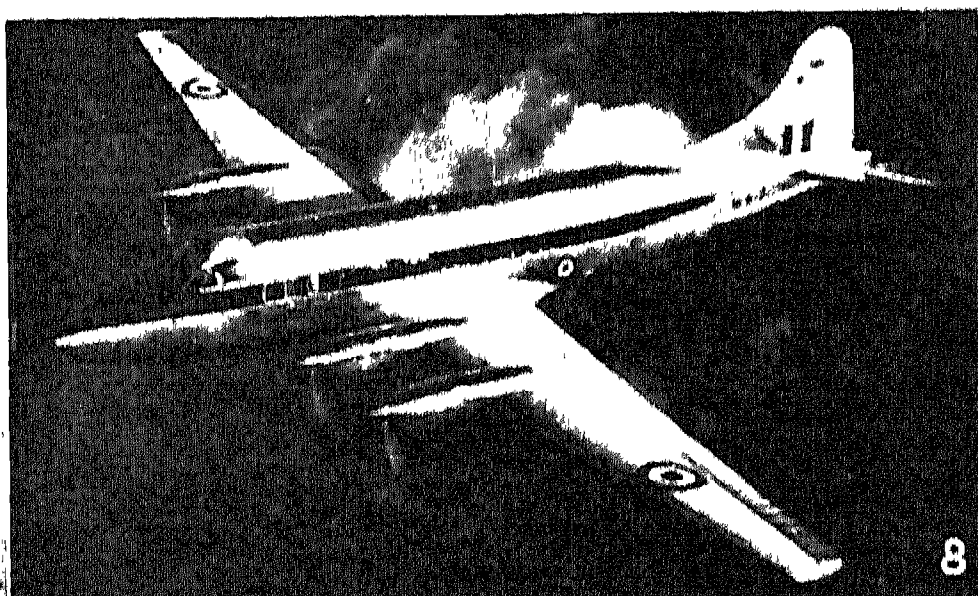
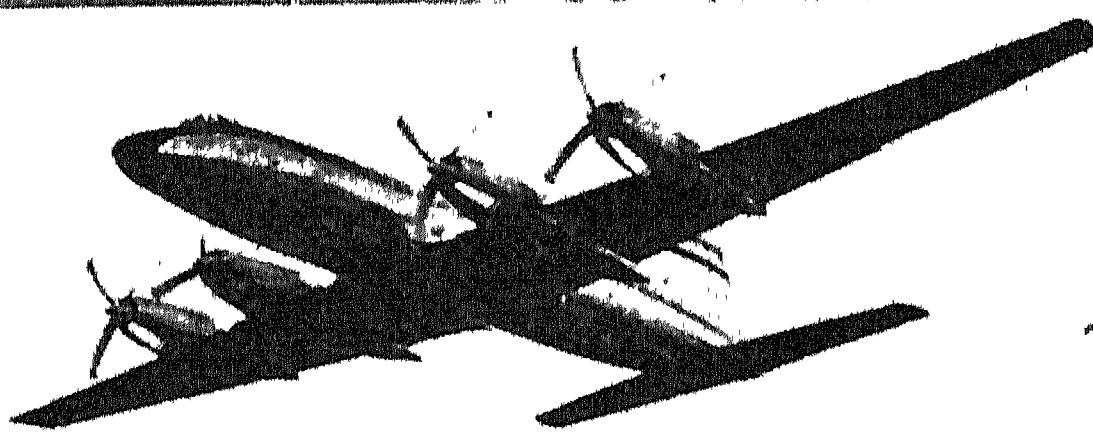
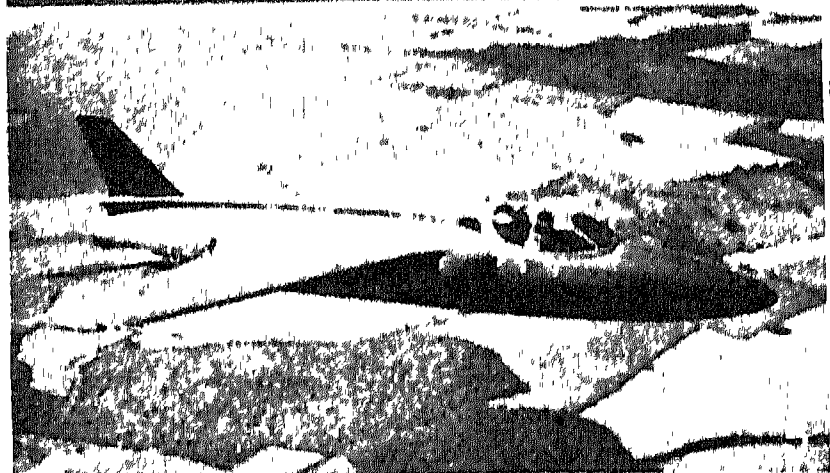
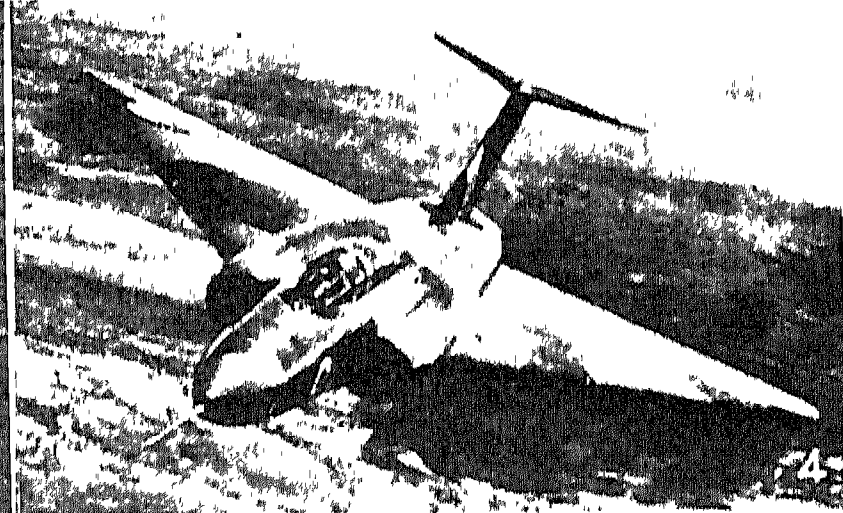
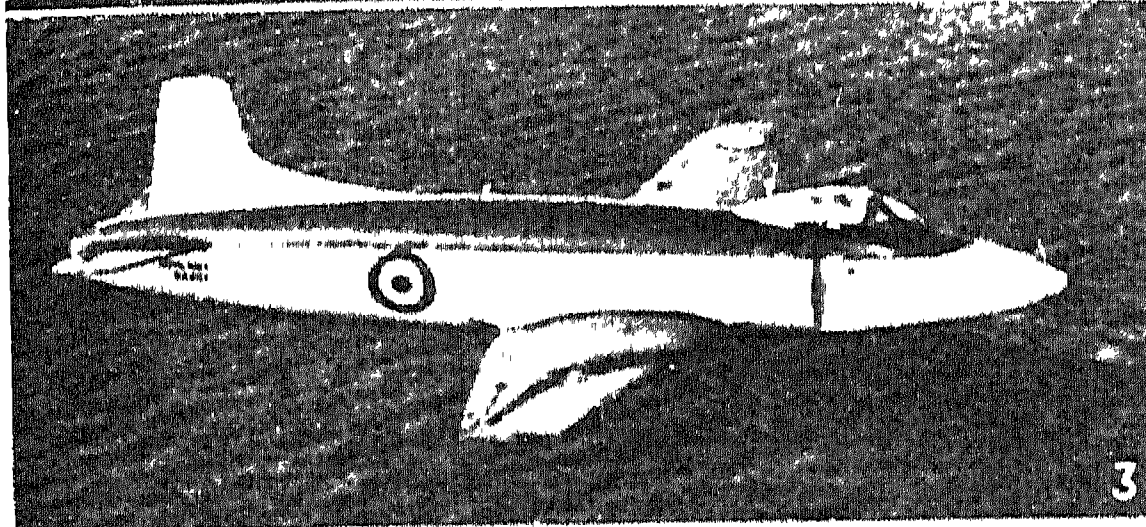
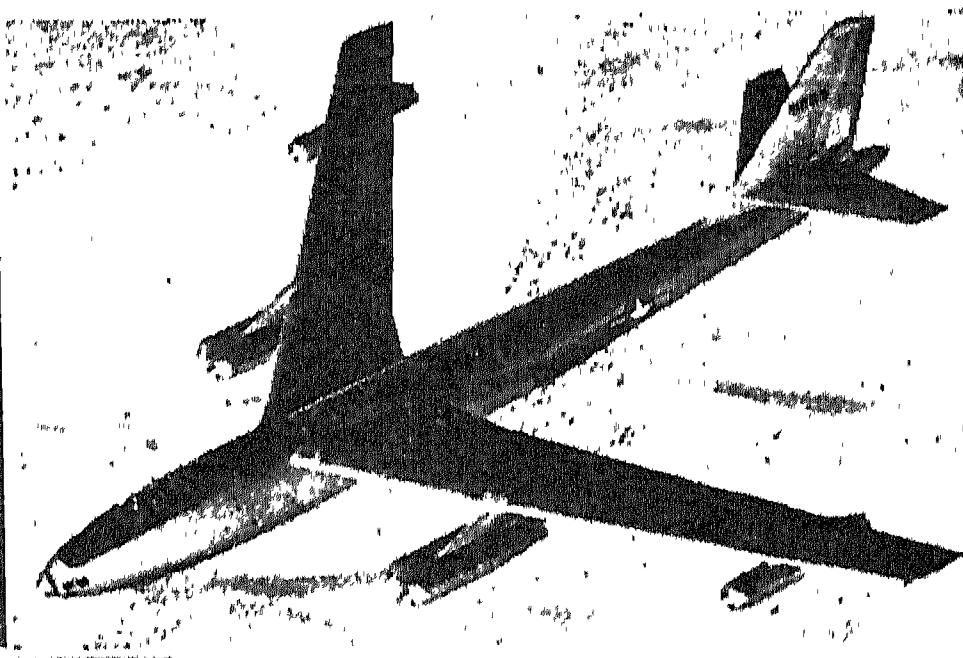
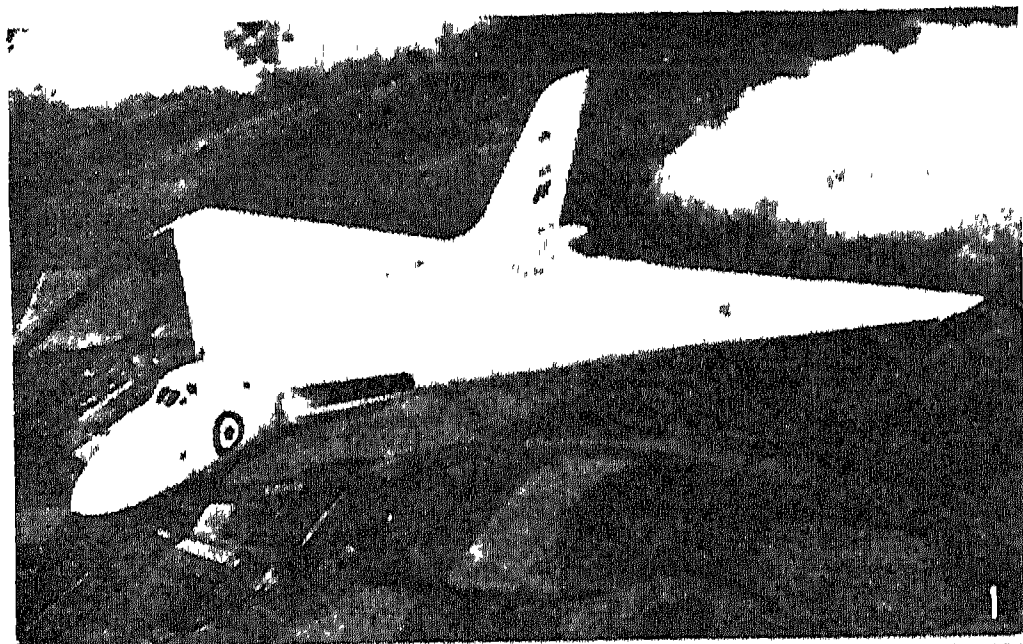
Thereafter monoplane airliners rapidly increased in size, carrying capacity, range, and engine power.



Aeroplane. Dornier Do-X, a German flying boat built in 1920 for long sea flights, the largest flying boat to be used commercially: it weighed 65 tons and had twelve 615 h.p. engines



Aeroplane. One of the eight Handley Page airliners introduced by Imperial Airways in 1931. These aircraft, which had a cruising speed of 105 m.p.h. and accommodated 24 passengers, were the last big commercial biplanes



1. Avro Vulcan delta-wing, four-engined jet bomber of the R.A.F. 2. U.S. Air Force Stratojet swept-wing jet bomber. 3. Royal Navy carrier-borne Vickers Attacker. 4. R.A.F. Gloster Javelin delta-wing jet fighter. 5. Folland Midge jet fighter designed for the R.A.F. 6. Bristol Britannia turbo-prop. airliner operated by B.O.A.C.

7. Vickers Viscount turbo-prop. airliner in service with British and U.S. airlines. 8. De Havilland piston-engine Heron designed as a military or civil light transport. 9. De Havilland four-engined jet airliner Comet II. 10. Boeing long-range, high altitude, Strato-cruiser airliner used for express services across the N. Atlantic.

**AEROPLANE : MILITARY AND CIVIL AIRCRAFT OF THE U.K. AND THE U.S.A.**



TABLE 2. AEROPLANE: WORLD ALTITUDE RECORDS

Date	Pilot	Aircraft	Altitude (feet)	Engine	H.P.	Place	Construction Details
1-12-09	H. Latham	Antoinette	1,486	Antoinette	50	Châlons (France)	M
8-12-10	G. Legagneux	Blériot	10,170	Gnome	50	Pau (France)	M
4-9-11	R. Garros	Blériot	12,828	Gnome	100	St. Malo (France)	M
11-12-12	R. Garros	Morane-Saulnier	18,405	Gnome	100	Tunis (France)	M; O
28-12-13	G. Legagneux	Blériot	20,078	Le Rhône	80	St. Raphael (France)	M; O
27-2-20	R. W. Schröder	Léperé	33,113	Liberty	400	Dayton (U.S.A.)	B; O
18-9-21	J. A. McReady	Léperé	34,507	Liberty	400	Dayton (U.S.A.)	B; O
30-10-23	Sadi-Lecointe	Nieuport-Delage	36,565	Hispano-Suiza	400	Paris (France)	M; O
25-7-27	C. A. Champion	Wright Apache	38,368	Pratt & Whitney	425	Washington (U.S.A.)	B; O
26-5-29	W. Neuenhoffer	Junkers W.34	41,795	Bristol Jupiter	420	Dessau (Germany)	M; O
4-6-30	A. Soucek	Wright Apache	43,166	Pratt & Whitney	450	Washington (U.S.A.)	B; O
16-9-32	C. F. Uuwins	Vickers Vespa	43,976	Bristol Pegasus	550	Bristol (U.K.)	B; O
28-10-33	G. Lemoine	Potez	44,819	Gnome-Rhône	870	Villacoublay (France)	B; O
11-4-34	R. Donati	Caproni	47,352	Bristol Pegasus	600	Rome (Italy)	B; O
28-10-36	F. R. D. Swain	Bristol	49,943	Bristol Pegasus	490	Farnborough (U.K.)	M; O
30-6-37	M. J. Adam	Bristol	53,937	Bristol Pegasus	490	Farnborough (U.K.)	M; O
22-10-38	M. Pezzi	Caproni	56,040	Plaggio	1,000	Montecelio (Italy)	B; O
23-3-48	J. Cunningham	Vampire	59,446	D.H. Ghost	J	Hatfield (U.K.)	M; R; P
4-5-53	W. Gibb	Canberra	63,668	2 Bristol Olympus	J	Bristol (U.K.)	M; R; P

J, jet engine (power measured in thrust). B, biplane. M, monoplane. O, pilot wore breathing apparatus. P, pressurised cockpit. R, retractable undercarriage.

(For balloon altitude records, see *Balloon*; for rocket altitude records, see *Rocket*.)

enabled pilots to fly blind through all weathers.

High-frequency radio beams were developed to provide an invisible guide line to a safe land-

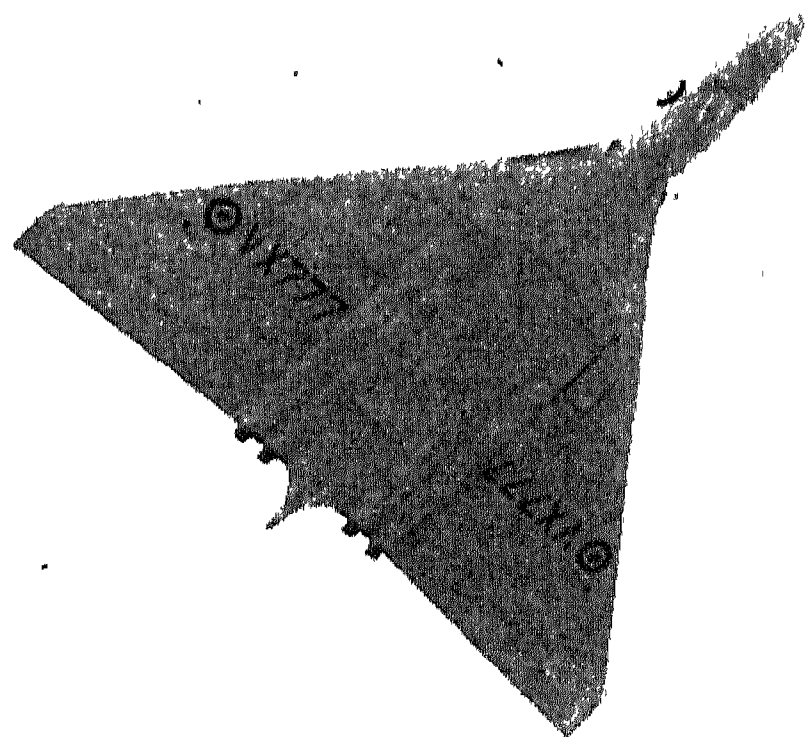
ted. The Comet airliner, powered by four turbo-jet engines, had a cruising speed of 490 m.p.h. and a range of 3,400 miles. It accom-

modated 48

passengers in a pressurised cabin. In 1952 the Comet went into service on several B.O.A.C. routes, but in 1954, following a series of accidents thought to be due to metal fatigue, it was withdrawn from service. In 1955 plans were being made to replace it by improved and more elaborately tested versions.

Appreciation of the importance of aerodynamic design could have achieved little in the development of the aeroplane

without a steadily-increasing efficiency in aircraft engines. This efficiency was mainly a matter of increasing the ratio of horse-power to weight. The first Wright engine developed 1 h.p. for every 21 lb. of its weight; by 1914 the ratio had been improved to 4 lb. of engine weight per horse-power developed, and by 1918 weight had been reduced to 1.8 lb. per horse-power. Immediately after the Second Great War, when the piston engine reached its greatest efficiency, power units had been built giving 1 h.p. for less than one pound weight of engine. Single piston engines were capable of well over 3,000 h.p. and further developments might have culminated in power units of 8,000 h.p., which is considered the ultimate limit of the piston-engine, and the limit at which an airscrew driven by it would be efficient. But before these limits could be achieved Jet Propulsion (*q.v.*) revised all conceptions of engine power and of aeroplane speeds.



Aeroplane. A revolutionary wing shape was the delta, as exemplified in this R.A.F. Avro Vulcan bomber photographed from below (see also page 135)

ing on a fog-bound aerodrome. Radar (*q.v.*) provided aircraft with anti-collision safeguards and means to navigate when flying blind. Radio-telegraphy and radio-telephony made possible continuous contact between ground and air and between airborne aircraft.

Experience gained in the manufacture of military aircraft during the Second Great War was embodied in greatly improved transport aeroplanes built after it. By 1950 giant passenger aeroplanes—*e.g.* the Boeing Stratocruiser, the jet-propelled D.H. Comet, the Bristol turbo-propeller Britannia—were being construc-



Aeroplane. The crescent-shaped wing, first used for the Handley Page Victor bomber, here shown photographed from beneath, increases the efficiency of high-altitude jet aircraft

later part of his life away from Athens, making two, perhaps three, visits to Sicily, where he died at Gela.

Seventy tragedies in all are credited to Aeschylus, of which only seven survive. Of these the best are *The Persians*, an expression of the sense of triumph felt by the Greeks after the Persian Wars; *Prometheus Bound*, a majestic portrayal of the myth of Prometheus, who stole fire from heaven, and taught the arts to mankind; and the great trilogy of the Agamemnon, *Choephori*, and *Eumenides*, which relates the return of Agamemnon from Troy, and his murder at the hands of Clytemnestra, his unfaithful wife; the vengeance exacted by his son Orestes, who kills his mother and her paramour; the pursuit of Orestes by the Furies, and his absolution by the Areopagus at Athens. The Agamemnon is the greatest of all the plays of Aeschylus and one of the world's masterpieces of dramatic literature. Seeing the wicked often prosperous and the good unfortunate in a world ruled by supposedly beneficent deities, Aeschylus endeavoured to explain this anomaly by conceiving a force called Necessity, which underlay the actions of both gods and men, and in the end made for righteousness. The idea of a family curse operating from generation to generation is a dominant motive of more than one of his tragedies.

The characters of Aeschylus are cast in heroic mould; his lofty earnestness and magnificent imagery make him one of the most sublime of the world's poets. Before the time of Aeschylus the action of a play was evolved from the dialogue between the chorus and a single actor. Aeschylus introduced a second actor, thus rendering practicable dramatic possibilities hitherto unthought of. There are English verse translations of the plays by E. V. Rieu, Lewis Campbell, and Gilbert Murray. Consult Aeschylus, *Creator of Tragedy*, Gilbert Murray, 1940.

**Aesculapius.** Roman, and better known, name of the Greek god Aesclepius. In classical mythology he was the god of medicine, though Homer speaks of him as a mortal. The son of Apollo and Coronis, he was a pupil of the centaur Chiron. By his knowledge of the healing art he was able to restore the dead to life, and his use of this power aroused the anger of Zeus, who killed him

with a thunderbolt. In later times the chief seat of his worship was Epidaure, where his temple served the purpose of a modern hospital. A guild called the Aesculapiae, of which Hippocrates was a member, was formed of his supposed descendants. The symbol of Aesculapius, a staff with a serpent twisted round it, is the badge of the R. A. M. C.

**Aesculin.** Glucoside discovered by Minor in 1830 in the bark of the horse chestnut, *Aesculus hippocastanum*. In aqueous solution it exhibits a beautiful blue fluorescence which disappears on adding an acid. With nitric acid a yellow solution is formed which turns to a characteristic blood red colour on adding ammonia.

**Aesica.** Roman fort at Great Chesters, on Hadrian's Wall, Northumberland, England. It was occupied in the 3rd century A.D. by the second cohort of Asturians recruited originally in Spain. Water was brought from Caw Burn along an open channel 6 m. long. A hoard of jewelry, including two exquisite late Celtic brooches, found here was placed in New castle museum.

**Aesir.** Collective name for the gods of Norse mythology, including Odin, Thor, Balder, Njord, Frey, Loki, who with Freyja and other goddesses dwelt in Asgard (home of the gods). They waged war against the powers of evil and were themselves threatened with



Aesop, famous Greek fabulist  
Bust in Villa Albani, Rome

destruction by Ragnarok, the twilight of the gods.

**Aesop** (c. 620-560 B.C.). Traditional author of the famous collection of fables. A native of Phrygia and originally a slave in Samos, he is said to have won the favour of Croesus, king of Lydia, who employed him on important missions. One of these was to Delphi, and Aesop, giving offence to the Delphians, was thrown over a precipice. Tradition represents him as very ugly but very witty. The fables in Greek verse by Babrius (3rd century A.D.) and in Latin verse by Phaedrus (1st cent.) contain translations or adaptations of many fables ascribed to Aesop.

**Aesthetics** (Gr. *aisthetikos*, perception). Body of mental concepts leading to a theory of beauty. The term Aesthetic is defined in the Oxford English Dictionary as "the philosophy or theory of taste or of the perception of the beautiful in nature and art." One of its purposes is to define the beautiful and to analyse the attitude to it of the human mind. The beautiful in its essence is a theme for the professed philosopher, though its concrete manifestations in nature and art appeal to the general intelligence.

Response to the perception of beauty does not move a person to action, but is contemplative, harmonious, restful, and disinterested in the sense that to enjoy beauty we do not monopolise it as in the pleasure of eating, for example, but share with others the satisfaction it affords. Objects which provide aesthetic satisfaction are in several categories, e.g. beauty in the ordinary sense, the sublime, the characteristic, and even the ugly.

What is presented in the arts affects us essentially in the same manner as the aesthetic material presented by nature, though there are differences, e.g. a great building may impress the beholder by its sublimity,



Aesculapius. Votive panel representing the god of healing, his daughter Hygieia, and two worshippers  
National Museum, Athens



**Affiliation** (Latin *ad*, to : *filius*, son). Legal term meaning the fixing of the paternity of an illegitimate child. In English law, an application for an affiliation order can be made only by a woman who is single or a widow or, in some circumstances, living separated from her husband. The mother may apply before the birth or within 12 months after it or, if the father has before then ceased to live in England, within 12 months after his return. She may apply at any later time if she can prove that the father in the 12 months after the birth paid money for the child's maintenance, or if before the child was born she was a party to a marriage which was void because she or the other party was under 16. At the hearing the mother's evidence must be corroborated by, e.g. admission by the father or acts of familiarity.

The minimum order is 30s. a week with, in addition, the costs of the birth and, if the child has died, the funeral expenses. The payments normally continue until the child is 13 or, if the court so directs, 16, and may later be extended until the child is 21 if the child is to continue full-time education or training. The payments end on the death or adoption of the child (unless it is adopted by the mother) or the death of the father; marriage of the mother after obtaining an order does not end the father's obligation to make the payments.

**Affinity** (Lat. *affinis*, bordering). In biology, an existing relationship or connexion between different species of animals or plants, pointing to a more or less common origin. It is estimated by the resemblance of structural characters, not by functions. Thus, a similar structural basis of a forelimb points to affinity irrespective of whether the limb be used for flight or other method of locomotion.

In chemistry, affinity is applied to the tendency which any two substances may have to combine with each other.

In English law, the term affinity is used to describe the relationship between the husband and his wife's relatives, or the wife and the husband's relatives. It is distinguished from consanguinity in which there is a blood relationship. Degrees of affinity considered by the Church a bar to marriage are set out in the Book of Common Prayer. Not all are legally binding: marriage with a deceased wife's sister was legalised in 1907; marriage with a deceased husband's

brother, 1921; marriage with a deceased wife's niece or aunt, 1931.

**Affirmation.** Solemn declaration made before a competent officer in place of an oath. Under the Oaths Act, 1888, any person who, on giving evidence, or upon any other occasion when an oath is required—e.g. on enlistment in the army—objects to being sworn, is allowed to make an affirmation instead, if the taking of an oath is contrary to his religious belief or if he has no religious belief. Such an affirmation has the same force as an oath, a witness who affirms falsely being fully guilty of perjury.

**Afforestation.** The raising of plantations of trees on land that is naturally bare or land that has not carried trees for a number of years. It is contrasted with re-afforestation (the replacement of recently felled trees). Afforestation includes replanting of areas of open inferior forest or of scrubland.

**Affray** (Fr. *effrayer*, to frighten). In English law, a disturbance of the public peace on the part of two or more persons by acts of violence which, while not grave enough to constitute a felony, are yet of such a nature as to terrify peaceful citizens. Mere threats do not amount to an affray; there must be a blow given or a weapon drawn. An affray differs from an assault in that an affray is a public offence. An assault in private is not an affray.

**Affreightment** (Fr. *affrètement*, the hiring of a ship). Contract under which a shipowner agrees, for remuneration, to carry goods in his ship. The remuneration is called freight. When a shipowner grants some person the right to use the whole or a principal part of a ship for carrying his goods, it is called chartering the ship; the person who has the right to have goods carried is called the charterer; and the document is called the charter-party. It is for the charterer to decide what goods shall be carried on the ship or the part chartered to him. A charter-party may be for a voyage or voyages, or for a period, e.g. a year, when it is called a time-charter. When the shipowner does not charter his ship, but agrees to carry specific goods, probably for different persons, the contracts of affreightment will be bills of lading.

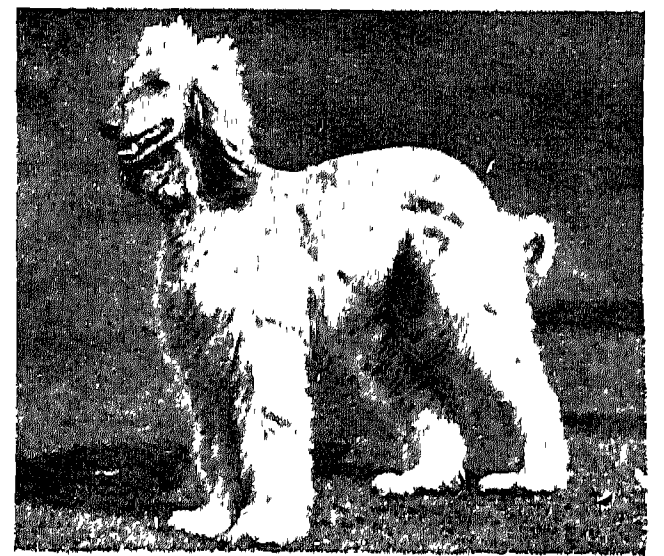
In the absence of special terms, a shipowner is responsible for the safety of the goods carried under a charter-party unless they are lost or damaged by reason of an act of God, the Queen's enemies, or inherent defect in the goods—e.g. in-

adequate packing. But it is the practice for shipowners to limit their liability very severely by the terms of the charter-party, and this they are free to do. But under the Carriage of Goods by Sea Act, 1924 (based on recommendations of an international conference at Brussels in 1922), it ceased from 1925, for goods carried under a bill of lading from a port in Great Britain or Northern Ireland, to be open to the parties to make any terms they please. The shipowner may by contract increase his liability, but he cannot reduce it. The main provisions of the act are that the shipowner undertakes to exercise due diligence to make the ship seaworthy; he is not liable for loss or damage not due to his own actual fault or privity or the fault or negligence of his servants; he is not liable for loss or damage over £100 per package unless the nature and value of goods is declared.

In addition, the shipowner's liability, whether under a charter-party or a bill of lading, is limited by the Merchant Shipping Act, 1894, to £8 per ton of the ship's tonnage in respect of loss or damage not due to his actual fault or privity.

**Affric.** Glen, river, and lake of Inverness-shire, Scotland. The glen is of exceptional beauty. The river, 18 m. long, which passes through it and the lake to join the Glass river, is included in the N. of Scotland hydro-electric installations.

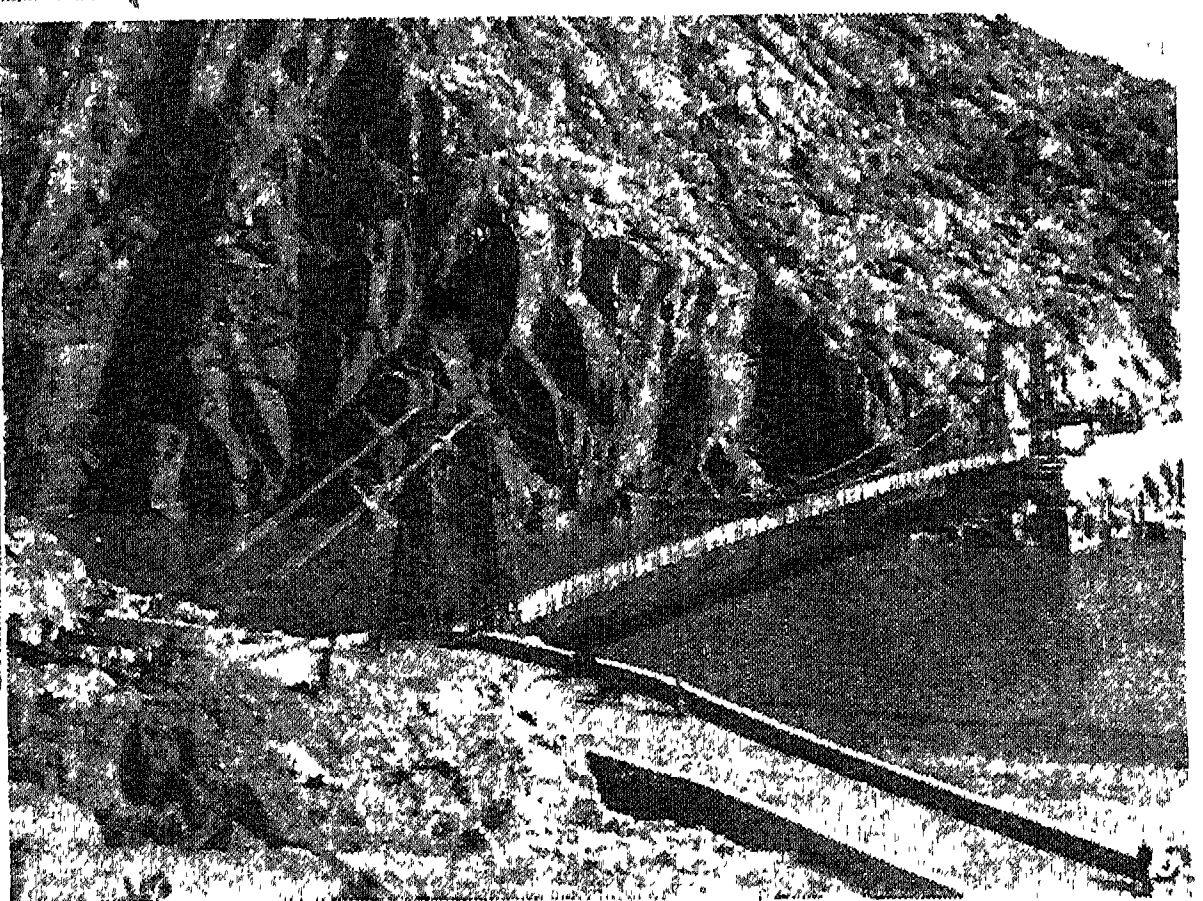
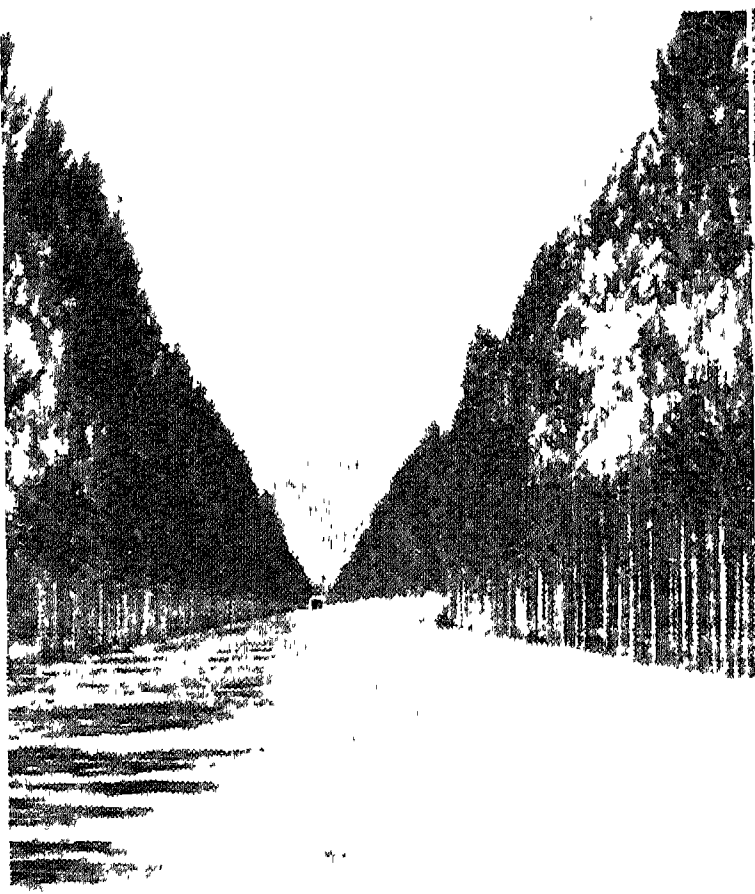
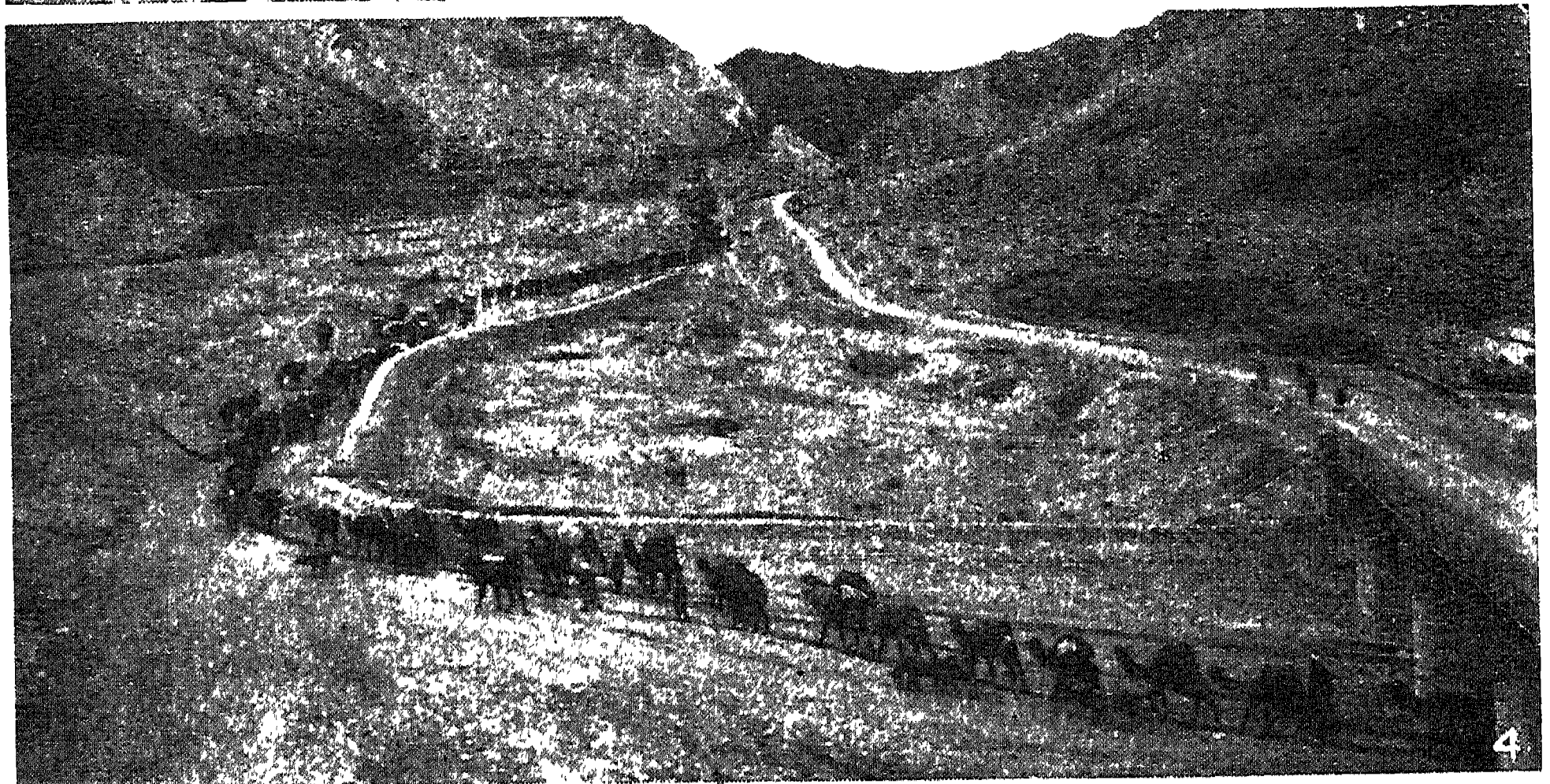
**Afghan Hound.** Breed of dog, probably an offshoot of the Arabian Saluki. A hunting dog in its native country, the Afghan can be trained as a highly intelligent and companionable home dog. The usual



Afghan Hound. Dignified specimen of this breed of large dog

height is 27 to 29 ins. The characteristic shock of silky hair on the top of the head and the contrast of short hair on the back with long hair on quarters and legs give it an appearance that is eccentric but dignified.





1. Leader of a camel caravan. 2. An inhabitant of E. Afghanistan, of the same stock as the tribesmen of north-west Pakistan. 3. Open-fronted shops and street-vendors in Kabul, the capital. 4. Camel train winding through

the Khyber Pass, a defile between Afghanistan and Pakistan. 5. A tree-lined motor road connecting Kabul with one of the provincial capitals. 6. Suspension bridge spanning the Kabul river to the west of Jalalabad

# **AFGHANISTAN : PEOPLE AND PLACES OF A KINGDOM OF THE MIDDLE EAST**



on Sept. 3, 1879, he and his companions were assassinated.

The ameer, Yakub Khan, was forced to abdicate, and in July, 1880, Abd-ur-Rahman Khan, grandson of Dost Mahomed, was recognized as ameer. In the meantime, Ayub Khan, a brother of the late ameer, marched upon Kandahar, and on July 27, 1880, the battle of Maiwand (*q.v.*) occurred. Eventually, Ayub Khan, totally defeated, fled to Persia on Oct. 4, 1881, leaving Abd-ur-Rahman as the sole ruler of Afghanistan. Abd-ur-Rahman reigned until Oct. 1, 1901, when he was succeeded by his son Habibullah Khan. In the Anglo-Russian Treaty of 1907 Great Britain undertook not to annex Afghanistan and the Russian government declared the country to be beyond the sphere of Russian influence.

In 1915 the German government sent a mission to Afghanistan to incite the ameer to assist in liberating India. The ameer firmly refused the inducements held out to him to forsake his British ally. He was assassinated on Feb. 20, 1919, and the throne was seized by his brother, although the rightful heir was the eldest son of the former ameer. Even after the accession of Amanullah, third son of Habibullah, the country remained unsettled, and in May armed bodies of Afghans crossed the Indian frontier (*see* Afghan Wars). In 1929, Amanullah, whose western ideas were repugnant to his countrymen, abdicated in favour of his brother, Inayatullah Khan, who, however, was forced to abdicate. Habibullah, a brigand chieftain, seized the throne, but was subsequently defeated and executed by Nadir, who became king. Nadir Shah was assassinated in 1933, and was succeeded by his son Mohammed Zahir Shah (b. 1914).

**Bibliography.** History of Afghanistan, G. B. Malletson, 1878; Asiatic Neighbours, S. S. Thorburn, 1894; At the Court of the Amir, J. A. Gray, 1895; Forty-one Years in India, Lord Roberts, 1898; Afghanistan, A. Hamilton, 1906; Under the Absolute Amir, F. A. Martin, 1907; Afghanistan, the Buffer State, J. G. Lyons, 1910; The Kingdom of Afghanistan, G. P. Tate, 1911; History of Afghanistan, Sir Percy Sykes, 1940.

**Afghan Wars.** The extension of the British dominion in India, coupled with fears of Russian aggression, led to wars between Great Britain and Afghanistan in 1838-42 and 1878-79. A further war broke out in 1919.

In 1838 Great Britain decided to restore the ex-ameer, Shah Sujah, whose place on the throne had been taken by Dost Mahomed. Under Sir John Keane an army marched through the Bolan Pass, entered Kandahar, and saw Shah Sujah crowned. The only serious resistance came from the fortress of Ghazni, but in July, 1839, it was successfully stormed.

In 1841 seven British officers were murdered in Kabul, and on Jan. 6, 1842, the garrison, which included 8,000 Anglo-Indian troops, surrendered on condition that they were allowed to return to India. A treaty was signed and the retreat began. In a pass between Kabul and Jalalabad all the troops and their followers, 16,000 men, women, and children, were overwhelmed and murdered, one man alone, Dr. Brydon, escaping. The Afghans followed the way to India, but General Sale held Jalalabad against them. An Anglo-Indian army forced the Khyber Pass, relieved Jalalabad, and in Sept. occupied Kabul, where it was joined by a column from Kandahar, which the British garrison had refused to surrender. At the end of the year Afghanistan was evacuated.

#### Shere Ali and Russia

In 1875 the British Government, alarmed for the safety of the Indian frontier, requested Shere Ali, the ameer to allow a British agent to reside at Herat. After some negotiations he refused, and in July, 1878, signed a treaty placing Afghanistan under the protection of Russia. The viceroy sent a mission to Afghanistan, but this was not allowed to enter the country, and war followed.

In Nov., 1878, three Anglo-Indian armies took the field. One entered Kandahar; a second occupied Jalalabad; but the third, under Roberts, reaching Kuram without opposition, there found an army of Afghans in a formidable position on the Peiwar Kotal. Roberts led a force round the enemy's flank, and on Dec. 2 drove them in headlong flight. On May 26 the treaty of Gandamak granted the British demands.

On Sept. 3 following, Sir Louis Cavagnari, the British representative at Kabul, and his staff were murdered. Roberts, sent there at once with an army, defeated the Afghans and entered Kabul. He remained there for nearly a year, engaged in almost constant hostilities. In July, 1880, a British force met with disaster at Maiwand, near Kandahar, and there followed

the siege of the British garrison in that city. Roberts was ordered to avenge the loss, and with 10,000 men, marching over 300 miles in three weeks, he defeated the Afghan army outside Kandahar on Sept. 1. British prestige was restored, and Abd-ur-Rahman, the candidate favoured by the Anglo-Indian authorities, eventually became ameer.

In May, 1919, Amanullah Khan began a campaign against the British, his troops crossing the frontier at several points in the Khyber Pass district.

Having seized three points in the hills N. of the Khyber, the Afghans advanced to Ashrafi Khel, and threatened Landi Kotal. Sir Arthur Barrett, commanding the British forces on the frontier, drove the enemy from the neighbourhood on May 9, and marching into Afghan territory occupied Dakka Fort, 10 m. N.W. of Landi Kotal. On May 16 the Afghans attacked Dakka in force, but were repulsed. Next day they were again defeated on the hills W. of the fort. On May 21 Jalalabad and Kabul were bombed from the air. The Afghans started an offensive in the Tochi and Gumal valleys, and a force of 3,500 Afghans attacked Thal Fort in the Kurram Valley, but these efforts failed. Amanullah made overtures for peace; a conference was held on July 26 at Rawalpindi, and peace was concluded on Aug. 8, the ameer forfeiting the subsidy of £120,000 a year which the Indian government had previously paid.

**Afnadu.** Town in (Italian) Somaliland. It lies 100 m. E. of the Kenya border. After severe bombing raids by the South African Air Force, the Italians evacuated the town on Feb. 10, 1941, and fled towards Kismayu. Afnadu was occupied by the King's African Rifles on Feb. 11.

**A fortiori** (Lat. from the stronger). Form of argument in which it is assumed that what has been found true or applicable to certain cases is with all the more reason true or applicable to the case under consideration. It may be thus expressed mathematically: if B is greater or less than C, and A is greater or less than B, much more then is A greater or less than C.

**Afranius**, LUCIUS (c. 100 B.C.). Roman comic dramatist. He wrote *comoediae togatae*, comedies dealing with Roman manners, as contrasted with those of Plautus and Terence, whose plots were more or less taken from Greek sources. Fragments of his writings survive.



Africa. Arabs with their camels in the Tunisian desert. The ridges formed by wind-blown sand are clearly seen in the foreground

The Ruwenzori range, which attains some 16,800 ft., was not formed by volcanic action.

**RIVERS AND LAKES.** Large areas of Africa have no outlet to the sea. The rest of the continent is for the most part drained by rivers flowing to the Atlantic or to the Mediterranean. The proximity to the Indian Ocean coastline of a long belt of highlands means that most rivers flowing to that ocean are short; the Zambezi (1,600 m.) and the Limpopo (800 m.) reach it through interruptions in the eastern highlands. The Nile (3,500 m.) flows northward to the Mediterranean from Victoria Nyanza.

The Senegal, the Black Volta, the White Volta, and above all the Niger and its tributaries drain West Africa to the Atlantic; the Niger's headwaters are in the Futa Jallon Highlands less than 200 miles from the sea, but the river flows N.E. before eventually curving towards the S.E. and reaching the sea, through a delta in Nigeria some 2,500 m. from its source. Farther south is the estuary of the Congo; this river (more than 3,000 m. long), with its great tributaries, drains the greater part of central Africa. Other rivers reaching the Atlantic include the Kwanza (or Cuanza), Kunene (or Cunene), and Orange.

Inland drainage systems include rivers that gradually lose themselves in desert regions, e.g. in the Sahara, or which flow to inland lakes, such as Lake Chad.

The principal lake system, in the Great Rift Valley, include Lakes Nyasa, Tanganyika, Kiva, Edward, Albert, and Rudolf, and the

Magadi-Natron lakes in Kenya. Victoria Nyanza, the water-filled lowest section of the African plateau in this region, is one of the main reservoirs for the White Nile. Other lakes of fresh or brackish water include Lakes Bangweulu



Africa. Village of Central Africa, in the Musgu country: this lies between Bornu (part of which is in Nigeria) and the country of Baghirmi

and Mweru in Northern Rhodesia; Rukwa in Tanganyika; Leopold II and Tumba in the Belgian Congo; Lake Chad in French Equatorial Africa; and Ngami in Bechuanaland, the last being mainly a vast swamp. There are extensive depressions which, after rains, become swamps, e.g. the Lorian swamps in Kenya, the

North Africa, now arid, produced cereals, while in Livingstone's time the region about Lake Ngami was relatively well-watered; moreover, it is thought that the volume of water flowing through the Zambezi is less now than when the Portuguese first reached it.

**CLIMATE.** The greater part of Africa lies within the tropics—the largest tropical land-mass in the world. Only along its northern and southern fringes, which are almost equidistant from the Equator, have European colonisers settled in large numbers because in general the tropical climates of Africa are inimical to white settlement.

The continent's climatic regions fall almost symmetrically north and south of the Equator. The Congo Basin, the Guinea



Africa. An oasis in the Libyan desert with its Arab village of irregular, flat-roofed houses roughly built of sun-dried mud bricks



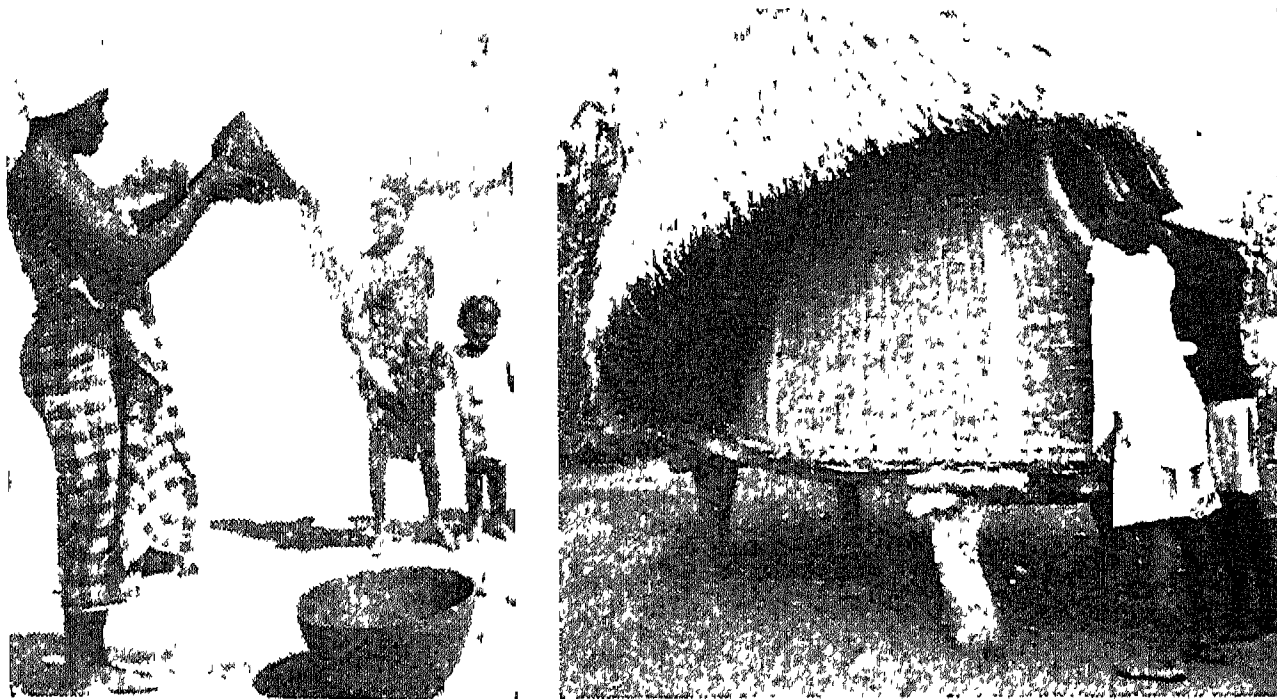


very important. The Natal coast-lands have woods (with palms, euphorbias, and wild banana trees) which deteriorate at higher altitudes into grasses and thorn veld; the High Veld is true plateau grassland with a few trees (acacias).

**FAUNA.** North of the Sahara the fauna is similar to that of Europe and Asia Minor and includes foxes, wolves, and bears; south of it is the African fauna proper. The open plains are the home of the antelope, giraffe, buffalo, zebra, wild ass, rhinoceros and lion, leopard and hyena; some of these occur also in north Africa. The elephant is found in both savanna and forest, and although virtually extinct south of the Zambezi, is still found in the Knysna and Addo districts of Cape Province. The chimpanzee and gorilla occur in the forests of western equatorial Africa and baboons are, with a few exceptions, peculiar to this continent. The okapi and giraffe are also indigenous—the okapi in the Semliki forests, the giraffe most commonly in southern French Sudan and Niger Territory, Somaliland, and Kenya. The hippopotamus and crocodile abound in the tropical rivers. The single-humped camel occurs in the northern deserts and steppes. Game laws and extensive preserves prevent the extermination of the rarer species of animals.

**Robert Jones**

**PEOPLES.** It is difficult to classify in detail the peoples of Africa. There are so many groups insufficiently documented; known groups fall into different categories according to the particular culture traits used in their classification, the evidence of physical characteristics cuts across that of culture.



Africa. Left: woman of Tanganyika winnowing grain by pouring it from one basket to another. Right: thatched beehive-shaped container for grain, used by the native peoples of Uganda

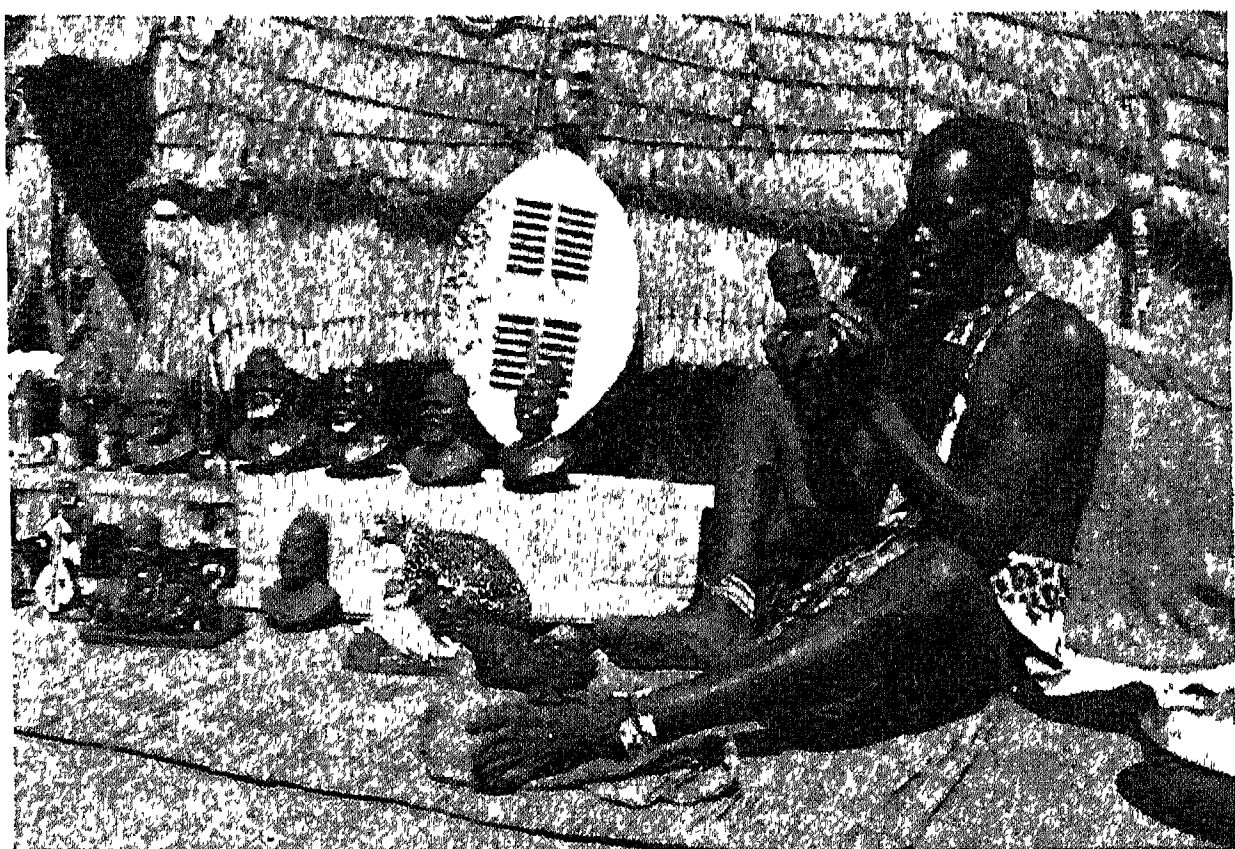
Physically the general uniformity of particular characters of adaptive significance in the peoples of Africa south of the Sahara, such as dark skin colour, linearity of physique, breadth of nose, thickness of lips, point to long evolution in their present tropical environments. Within this broad framework differences in detail appear to be greater between peoples of different main linguistic groupings and from region to region, than between peoples of the same language group inhabiting a single region. Similarly, when allowance has been made for those items of culture directly related to habitat, there is a general tendency for the main cultural pattern to coincide with the broad linguistic pattern; and the peoples are classified here on the basis of linguistic evidence.

**Negro:** (1) Bantu-speaking peoples form the greater part of the population of the continent south of the line running roughly eastwards from the mouth of the Rio del Rey to Mombasa. Before

the arrival of the colonising modern European, there were numerous migrations recorded in tradition, the last of which occurred during the times of the early white settlers. These migrations (facilitated by the geographical conditions of Africa) have resulted in rather more uniformity of culture and physical appearance than might have been expected, though there remain considerable differences in detail from people to people.

Most Bantu peoples, unless prevented by some adverse environmental factor (such as the presence of tsetse), keep cattle, which constitute more than an economic asset: they are often associated with religious and magical beliefs and practices; they measure social prestige as distinct from economic wealth: they are used in the payment of bridewealth by the family of the bridegroom to that of the bride which serves so important a function, that of "marriage insurance," in the society. Most of the Bantu practise agriculture, usually some form of shifting cultivation, consisting of alternate cultivation and abandonment of their land.

Among some, political organization is not centralised but diffuse, elders having some authority over their own groups but recognizing no common allegiance. Others have been united under a single ruler, with highly organized systems of government. Sometimes authority is vested in a single clan, whose head appoints lesser chiefs; the kingdom of Buganda, for example, reached an extremely intricate degree of development of this nature which compared favourably with that attained in many European states of fairly recent history. The political unit tends not to be associated with



Africa. Zulu craftsman in one of the reserves for native peoples in South Africa modelling portrait busts in clay



particular areas of land, but with particular groups of persons.

Most peoples practise some form of initiation ceremony, or series of ceremonies, at the time of admission of individuals into the adult state. Associated with these ceremonies are periods of instruction, of formalised education in matters not acquired during the ordinary day-to-day experiences which form the main part of the preparation for full participation in the way of life of the particular people. Sometimes initiation is linked with the division of males of the society into age grades, training of which constituted the source of the military power of the people, for example of the Zulu. Military organization in other peoples, *e.g.* the Baganda, was on the basis of personal ties instead of age grades.

In many peoples the chief or particular elders have ritual as well as political duties to perform, and upon the satisfactory performance of these ceremonies the prosperity of the people and the fertility of their herds and crops (supposedly) depend. Some peoples, notably those in the region of Victoria Nyanza, developed a special priesthood. Religion in most of the Bantu included the performance of sacrifice, the dominance of an ancestral cult, and usually the existence of a vague higher power.

(2) The Sudanic-speaking peoples are thought to be numerically similar to the Bantu. The basis of their economy is agriculture, though where tsetse is absent some cattle are kept. Hunting plays an important part, especially in the eastern groups (*e.g.* Bongo, Madi). Economic specialisation is more developed among them, especially in the west, and consequently trading, in which women actively engage, plays a more important part; several large cities have evolved.

Political organization varies between extremes of centralis-



Africa. Boys of the Boloki-speaking group, Belgian Congo

ation and dispersion. The Ibo of Nigeria consist of some 2,000 social units, for which there is no single ruler; in each the village elders and individuals with personality or possessions share authority. Among the Akan of the Gold Coast, chiefs and their councils hold sway over large areas, sometimes by allegiance from lesser chiefs.

Characteristic of most of these peoples is the influence exerted

by secret societies responsible for maintenance of discipline and respect for custom, thereby serving a useful purpose in the preservation of law and order; membership is obtained by the payment of dues. Age sets exist among many of these peoples, being associated in some instances, *e.g.* among the Cross River Ibo, with the performance of public duties such as policing or clearing paths.

In their customary rites human sacrifice and cannibalism played a significant but very small part. The cult of earth spirits, closely associated with ancestral spirits, is much more widespread; fertility of the soil is considered to be dependent on their favour. A supreme deity is frequently at the head of the spirit hierarchy.

(3) The Nilotic and Nilo-Hamitic peoples are less numerous than the Bantu- and Sudanic-speaking groups. Among them economic and social emphasis is on cattle, though some agriculture is usually practised, in a few groups almost exclusively.

Northern Nilotic peoples tend to look down on hunting, which is highly esteemed by some southern groups. Authority among Dinka and Nuer is diffuse, but in the Shilluk near by is centralised, being vested in the king. Absence of a political head is characteristic of the Nilo-Hamites, who are notable also for the absence of villages. Socially the system of descent groups, clans, and lineages is dominant, affecting many activities. Age divisions are marked. Among the Masai the main function of age groups was formerly to provide a permanent source of manpower for fighting.

The dominant form of religion among the Nilo-Hamites is an ancestor-cult associated with a belief in a supreme being, between whom and man the ancestral spirits act as mediators. Among the Nilotes, the importance of the ancestor-cult varies from people to people, but seems to occupy



Africa. Mother and children of Manicaland, a district of Mozambique once administered by the Mozambique Company

a subordinate position. Material culture among these peoples is not extensive. Bodily mutilations occur throughout the Nilo-Hamites and Nilotes, most tribes practising extraction of some front teeth.

**Hamito-Semitic:** The peoples speaking Hamito-Semitic languages are very diverse. Galla and Borana and Somali are nomadic dwellers in deserts and semi-deserts of eastern Africa, Tuareg and Beduin in the Sahara, all possessing material cultures that are meagre on account of the need for constant movement, all making use of flocks as intermediaries to draw subsistence from their surroundings. With more complex material culture are the Egyptians of today, the cultivating peoples of north-west Africa and the oases, and the Abyssinians. Physically these peoples are more akin to the Europeans than to other Africans, being lighter skinned, having narrower noses, thinner lips, etc. It is among them that the more advanced religions (Christianity and Islam) are found, though some groups are pagan.

**Khoisan:** The Khoisan peoples are chiefly represented by the Bushmen and Hottentots. They possess distinct physical characters, yellower skin, the "peppercorn" hair, the absence of prognathism in the face. Bushmen are skilful hunters, and subsist by means of hunting and the collection of wild plants and roots. Hottentots physically and culturally, though not linguistically, are pastoralists owning long-horned cattle and fat-tailed sheep. Found only in the semi-desert regions of South-West Africa, whither they were driven by the pressure of stronger tribes, they are relatively few in number.

**LANGUAGES.** The number of African languages is not known. Written forms of between 200 and 300 have been produced by mission workers, and there remains a greater number yet to be so reduced. The first classification was apparently that of Richard Lepsius (1810-84), of Berlin, who, before 1880, recognized three major groups—(1) Semitic, (2) Hamitic, (3) Primitive African—(a) Bantu, (b) Mixed Negro. The classification proposed in 1935 by Diedrich H. Westermann (b. 1875),

professor of African languages in Berlin, envisages three main families as follows:—

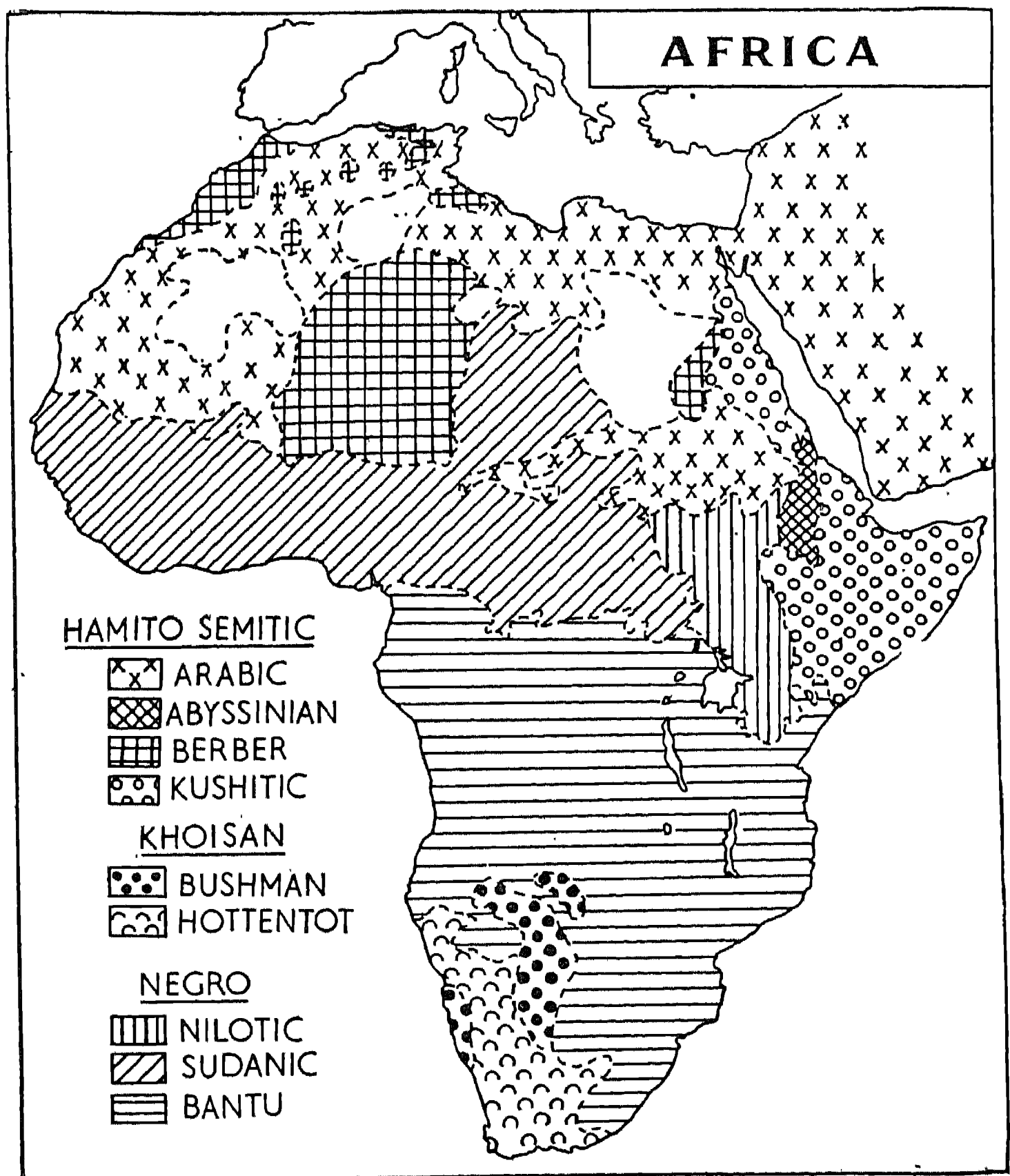
1. Khoisan
2. Negro: (a) Bantu  
(b) Sudanic  
(c) Nilotic
3. Hamito-Semitic

The *Khoisan* languages include those of the Bushmen, of which three main groups covering 17 dialects have been distinguished; those spoken by Hottentots, of which four main groups have been distinguished, though today only two of these (Nama and Korana) are spoken. Khoisan languages are distinguished by the presence of click sounds together with many less audibly conspicuous features. The language of the

formed a single group despite their broad geographical extent throughout almost all Africa south of lat. 4° N. was recognized as long ago as 1862. Bantu languages are agglutinative in structure, being characterised by the use of prefixes to indicate precise meaning.

(b) The Sudanic languages, many as yet unrecorded, are spoken in the area between the Equator and the Sahara. Some of them seem to be very different from others, and there have been several attempts at their classification. Westermann's grouping, not universally accepted, contains 4 sub-divisions—

1. Nigritic, or Old Sudanic, comprising a western group which includes Ewe-Akan and the



Africa. Map indicating the distribution of peoples and language groups

Sandawe in Tanganyika has affinities with Nama Hottentot, possessing the characteristic clicks, and may be related to that group.

The *Negro* languages: (a) The Bantu languages have been more fully studied than either of the other two sub-groups. That they

Kwa (Ibo, Nupe, Yoruba) tongues; and an eastern division including Moru-Madi, Bongo-Mittu, and Ndogo-Bviri.

2. The Mande languages (Bambara and Mandingo), very close to the Nigritic.
3. The Inner Sudan group spoken in the northern parts of French



Equatorial Africa—for instance, Boudouma.

4. The "class" languages, occurring right across Africa from Kordofan to the west coast. These include the languages of the delta area of southern Nigeria, for example Tiv, and the Gur languages in the north of the Gold Coast and Togoland (Mossi-Dagbano, etc.).

(c) The Nilotic language sub-family is of more limited distribution, being found in the Upper Nile region, Uganda, Kenya, and parts of Tanganyika. There are two main branches—

1. Nilotic languages proper comprise two main sub-divisions, the Dinka-Nuer group and the Shilluk-Luo-Acholi group.
2. Nilo-Hamitic languages include Bari, Kipsigis, and Masai.

The *Hamito-Semitic* languages, found in the north and north-east of the continent, comprise a number of sub-divisions of which four are especially extensive. The Berber languages are spoken in parts of north-west Africa, in oases scattered across north Africa, and by the Tuareg of the Sahara. Arabic dialects occur right across north Africa from the coast of the Atlantic to that of the Red Sea. Abyssinian dialects are restricted to peoples of the plateau of Abyssinia. The Kuschitic group contains Galla, Somali, and various dialects of peoples inhabiting the eastern horn of Africa. These languages are highly inflected.

D. F. Roberts

**AGRICULTURE.** The regions of equatorial climate, with high rainfall and constant heat, produce manioc and cassava, bananas and yams, palm oil and palm kernels,

cacao in Nigeria, the Gold Coast, Sierra Leone, French Togoland, and Angola; and rubber (the Belgian Congo, along the Guinea Coast, and in Liberia). Outside the areas of equatorial forest, where rainfall is lower, yams and manioc are still cultivated as local food crops, but maize, millet, and rice are also important. Maize is grown widely throughout tropical Africa in an area extending from Senegal, through the grasslands of interior west north-central Africa to Kenya and Uganda, thence through the Rhodesias to South Africa, including Mozambique and Angola; Algeria and Egypt also



Africa. Native worker tapping a wild rubber tree in the forests of the Congo river basin

produce maize. Millet is grown particularly in the savannas south of the Sahara.

Rice is grown in the republic of Sudan, in places with the help of



Africa. Splitting cacao pods in W. Africa to extract the cocoa "beans"

artificial irrigation. Egypt also produces rice on irrigated land. Commercial crops of tropical Africa include groundnuts (especially north of the coastal forests of West Africa, but also in Uganda and Southern Rhodesia), tobacco (the Rhodesias, Angola, Tanganyika, Swaziland, and Algeria), and cotton (Sudan, where it is grown with irrigation in places, and East Africa—it is Uganda's chief farm product; Egypt is an extremely important cotton-growing country, cultivation being confined to areas irrigated from the Nile).

Coffee and tea are cash crops in British East Africa, Uganda being the main Commonwealth producer of coffee; Angola, Abyssinia, and the Guinea Coast are other areas of coffee-growing. Sisal is concentrated particularly in East Africa, Tanganyika being the world's chief source of this crop, but it is also grown in Portuguese Angola and in



Village street in Monsembe, in the Congo country. All of the dwellings shown were the property of one man; indeed, were his multiple home, for in each of the huts he kept a wife. Each fresh marriage entailed the building of a new dwelling, as, however many a man's wives were, two were not expected to share one house

**AFRICA: THE MANY HOMES OF A MUCH-MARRIED AFRICAN OF THE CONGO COUNTRY**



Africa. Donkey and camel caravan on a metalled road winding through sandhills near Marrakesh, Morocco

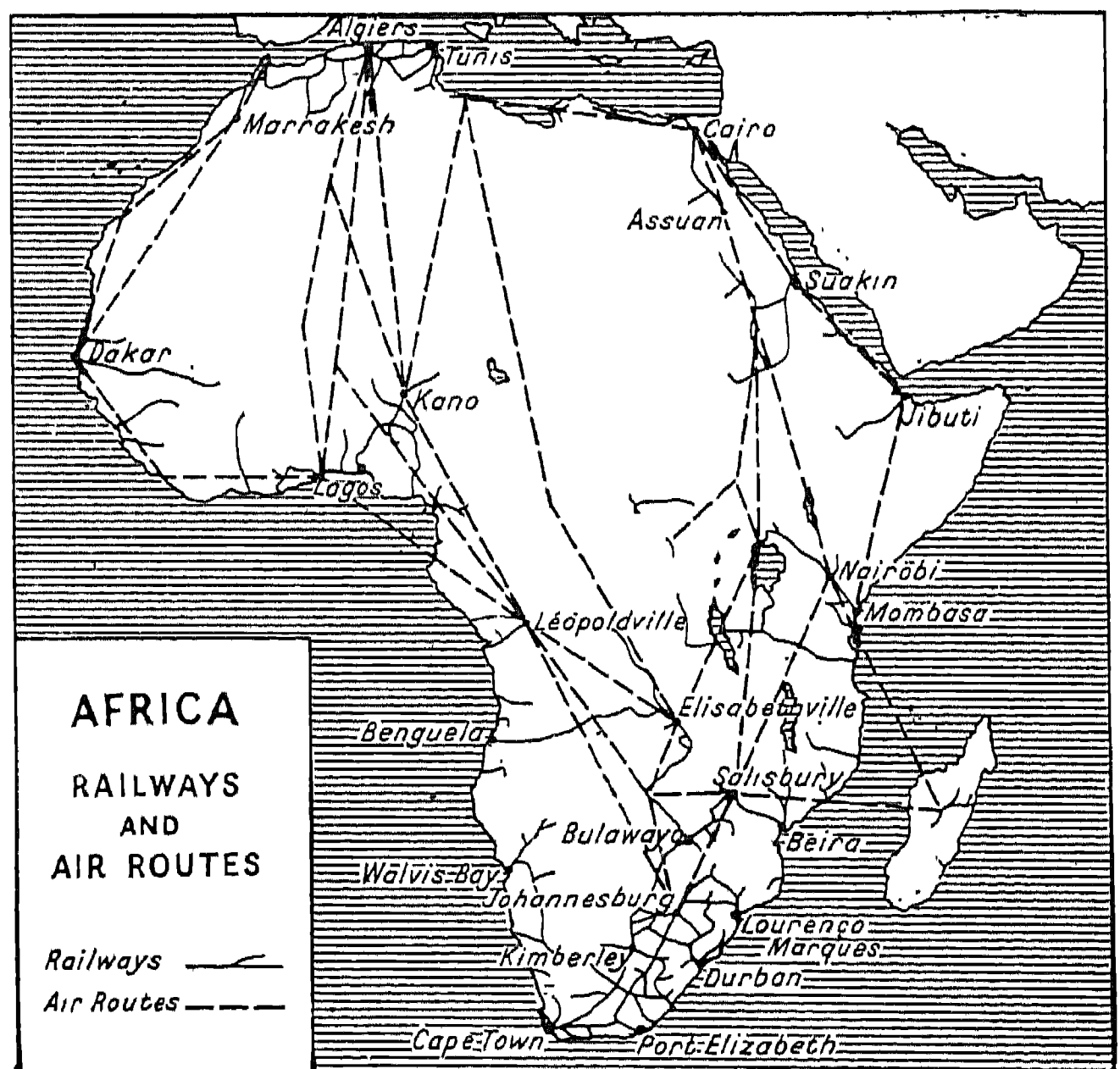
these methods remain current in areas not served by roads or railways. Broadly speaking, railway construction has been undertaken to connect inland areas of economic development with the coast or to provide links at breaks in river navigation. Railways were first built in Egypt in 1856, in Algeria, 1857, and in Cape Colony, 1859. There are three main gauges on African lines—the Cape Gauge (3 ft. 6 ins.) in South Africa, the Sudan, Nigeria, etc.; the metre gauge (3 ft. 3½ ins.) used in French territories (former colonies), and for the Uganda railway, etc.; and the standard gauge (4 ft. 8½ ins.) of many Algerian and some Egyptian lines. The late 19th century was a great time of colonial expansion and of railway construction in different parts of Africa, the main railways being:

- (1) Cape Town to Katanga, via Kimberley, Bulawayo, and Lusaka (Northern Rhodesia).
- (2) Bulawayo to Salisbury and Beira, providing an outlet for both Rhodesian and Katangan products.
- (3) Katanga to Port Francqui on the Kasai tributary of the Congo—another route for the export of Katanga minerals, as is also
- (4) Katanga to Benguela and Lobito in Angola.
- (5) The railway network of the eastern Union of South Africa, which links the population centres on the veld (e.g. Johannesburg, Pretoria, Bloemfontein) and also connects that region with the coast at

Lourenço Marques (in Mozambique), Durban, East London, and Port Elizabeth.

- (6) De Aar, on the Cape Town-Kimberley railway, to South-West Africa (Windhoek and Walvis Bay, with branches to Luderitz Bay, Gobabis, and north-eastern districts of the Territory).
- (7) Beira to Tete (Mozambique) and Salima (Nyasaland).
- (8) The Tanganyika system, from Dar-es-Salaam to Kigoma on Lake Tanganyika and Mwanza on Lake Victoria; this was constructed to tap the productive agricultural areas of central Tanganyika as well as to serve possibly as an outlet for east-central Africa.
- (9) The railways of Kenya and Uganda (Mombasa to Kampala), along which, with their branches, European settlement has taken place.

- (10) The Congo system: Albertville (on Lake Tanganyika) to Kabalo and Kindu; Ponthierville to Stanleyville (at a break in river navigation); Léopoldville to Matadi (bypassing the lower Congo, which is not navigable); and Brazzaville to Pointe Noire.
- (11) The railways of north-west Africa, providing a route from Marrakesh to Casablanca, thence through north-east Morocco (with a branch to Tangier) to Oran, Algiers, Constantine (with other branches to the ports of Philippeville and Bône), and Tunis and Sfax. Branches cross the Atlas Mountains to Colomb Béchar, Abadla, and Tougourt; and run westward from Sfax to Tozeur on the Shott el Jerid.
- (12) The Nile valley railways from Alexandria through Cairo to Assuan at the First Cataract; and from Wady Halfa to Khartum and along the Blue Nile to Sennar to meet a line which links the upper Nile valley with the Red Sea coast at Port Sudan and Suakin; from Sennar another railway runs west to El Obeid. The coastal settlements of N. E. Libya and N. W. Egypt are connected by a Tobruk-Alexandria line.
- (13) The savanna lands of northern Nigeria are brought into





Portuguese almost completely from the Guinea Coast and west Africa became the scene of intense commercial rivalry between these nations, attracted mainly by the trade in slaves and gold. European settlements here were intended not as colonies but as trading centres, and comparatively little was known of the geography of the interior until the late 18th century. The Dutch in 1652 founded a calling station on Table Bay in south Africa and later extended their sway over a small area lying behind the port.

Exploration of the interior of tropical Africa began with efforts to solve two problems: to discover the sources of the Nile and the course of the Niger. James Bruce (1730-94), in an expedition in 1770-72, found the source of the Blue Nile and traced it to its confluence with the White Nile; Mungo Park and the brothers Lander discovered the true course of the Niger, speculation concerning which had produced a variety of guesses by early cartographers. Discoveries in west Africa were followed, in the 19th century, by the establishment of spheres of influence in this region by European Powers looking for raw materials and markets for their developing industries. In 1857, France and Great Britain agreed upon a partition of the region; France also planned the annexation of the whole Sudan west of Lake Chad. Germany in 1884 proclaimed a protectorate over Togoland. Liberia, founded mainly through American influence in 1822 as a colony for emancipated slaves, was constituted in 1847 a free and independent republic.

European knowledge of central and much of east Africa dates from the travels of David Livingstone, H. M. Stanley, and John Speke. Speke discovered Lake Tanganyika and the Nile outlet from Lake Victoria. Livingstone journeyed through much of south-central Africa from the Atlantic to the Indian Ocean. Stanley showed that the rivers west of Lake Tanganyika drained to the Congo and that the main stream flowed to the Atlantic. After these journeys of exploration central Africa was divided among the major European nations, as had been the Guinea Coast. Portugal wanted to link Angola with Mozambique; Great Britain wanted the area later named Rhodesia and Nyasaland; King Leopold II of the Belgians secured as his own personal property most

of the Congo basin; Germany declared a protectorate of South-West Africa.

In east Africa, Arab trade had brought about a great deal of knowledge of the interior. The sultan of Zanzibar claimed much of the territory later called Kenya and Tanganyika, but Great Britain and Germany acquired leases along the coast and established spheres of influence to the west. Great Britain also gained control of Uganda.

British penetration of South Africa was stimulated by the discovery of a rich diamond field in 1866 at Colesberg Kopje, site at which Kimberley was founded in 1871, and the proclamation of the Rand goldfield in 1886. (Dutch farmers had already sparsely settled the High Veld in the 1830s despite fierce opposition from its Bantu inhabitants.) The wealth gained from diamond and gold mining provided capital for expansion northwards into the Rhodesias, an area which was administered from 1889 into the 1920s by the British S. Africa Company.

French aspirations in north Africa were concentrated first upon Algeria where a punitive expedition was sent in 1830 against the Barbary pirates. Exploratory parties mapped the main features of the central and eastern Sudan, and France planned to acquire dominion over the whole territory, from the Atlantic to the Red Sea. But Egypt, virtually a British protectorate after 1880, and Great Britain succeeded in frustrating French plans in the region of the upper Nile, setting up the condominium of the Anglo-Egyptian Sudan, 1898. France eventually gained control over the rest of the Sudan and over north-west Africa (Tunisia became a French protectorate in 1881, Morocco in 1912), with the exception of the Spanish possessions of Rio de Oro, Ifni, and the Riff territory, and the international zone of Tangier.

Italy, entering the colonial struggle late in the 19th century, in 1889 established a protectorate over Eritrea; drove the Turks from Libya in 1911; and in 1927 secured part of Somaliland.

Thus the European partitioning of Africa was virtually complete by the outbreak of the First Great War, at the end of which Germany

ceased to be a power in Africa, mandates being given by the League of Nations to the U.K., France, Belgium, and the Union of South Africa for parts of the former German possessions.

In 1922 Egypt became a fully independent state. Abyssinia, overrun by Italy in 1936, was restored to independence, 1941; Libya was created a kingdom, 1951; the Anglo-Egyptian Sudan was proclaimed the republic of Sudan, 1956, in which year also Tunisia and Morocco achieved independence.

**Bibliography.** The Story of Africa and its Explorers, 1892-95; The Dual Mandate in British Tropical Africa, Sir Frederick (Lord) Lugard, 1929; Africa: a Geography, W. Fitzgerald, 1934; An African Survey, Lord Hailey, 1938; The Germans and East Africa, E. Lewin, 1938; Africa Emergent, W. M. Macmillan, 1940. Consult also works by E. G. Ravenstein; T. E. Bowdich; James Bruce; Sir Harry Johnston; Mungo Park; R. Caillie; David Livingstone; Sir Henry Stanley; Sir Robert Burton; J. L. Krapf; J. H. Speke; Sir Samuel Baker; G. Schweinfurth; J. Thomson; W. Junker, etc.

**Africa General Service Medal.** British medal authorised in 1902 for service with military expeditions in East, Central, and West Africa. See Medals, colour plate.

**African Lily** (*Agapanthus umbellatus*). Fine bulbous plant of the family Liliaceae, with long, fleshy, strap-shaped leaves, from the middle of which rises a leafless axis, two or three feet high, bearing at the top an umbel of many bright blue, funnel-shaped flowers. It is a native of South Africa, whence it was introduced to English conservatories in 1692.



African Lily. Right: Single flower of the umbel

**African Marigold** (*Tagetes erecta*). Garden annual with a misleading name, for both this and its smaller congener, the French marigold (*Tagetes patula*), are natives of Mexico. They have much-divided leaves, the lance-shaped divisions having toothed edges. The composite flower-heads are borne singly on long stalks, which are thickened



African Marigold. *Tagetes*

Bruggen, "Sangiro," the Hobson brothers, P. de V. Pienaar, Hettie Smit, and A. H. Jonker, and the poets W. E. G. Louw, N. P. van Wyk Louw, I. D. du Plessis. Uys Krige, Elisabeth Eybers, D. J. Opperman, etc. Consult Professor J. J. Smith's authoritative article on the origin of Afrikaans in the Official Union Year Book for 1925; The Achievement of Afrikaans, by T. J. Haarhoff; and, in Afrikaans, E. C. Pienaar's Die Triomf van Afrikaans; Groot Verseboek, ed. D. J. Opperman; also Afrikaans Woordeboek (dictionary), vol. I, 1953.

**Afrika Korps.** German army corps of the Second Great War. Erwin Rommel, after playing an important rôle on Hitler's staff in the Polish campaign of 1939 and commanding a division in France in 1940, was entrusted with one of Hitler's most ambitious military experiments — the formation of a body of soldiers to serve in North Africa. The men, specially selected by Rommel, were trained at a camp near Hamburg in artificially created conditions approximating as closely as possible to those in Libya and Egypt.

In March, 1941, almost simultaneously with the German attack on Greece, the highly mechanised divisions of the Afrika Korps arrived to reinforce the shattered Italian forces, driving Wavell's troops back across Libya to the Egyptian border. The Afrika Korps was eventually defeated at Alamein, Oct., 1942. See Alamein; North Africa Campaigns.

**Afrikaner Bond.** Association of Afrikaners, i.e. South Africans of Dutch origin, formed in the Cape Colony by Rev. S. J. du Toit in 1879. Under J. H. Hofmeyr, it organized the rural electorate in support of self-government under the British crown. Though showing little sympathy with Kruger, it criticised the policy of Milner. In 1909 its leaders unsuccessfully advocated federation of the South African colonies, as opposed to union.

**Afrit.** Alternative spelling of Ifrit (*q.v.*), a demon in Arabian folklore.

**Afrosmosia.** Large tree, 100 to 150 ft. in height, of tropical W. Africa, belonging to the family Leguminosae. The timber is brownish yellow and was first imported into Great Britain in 1948. It shows a certain resemblance, and has been used as an alternative, to teak. The timber

is sometimes called kokrodua, a native name for the tree in Ashanti and the Gold Coast.

**Afterbirth.** Term which includes the placenta, or mass of tissue uniting the infant with its mother while in the womb, by means of the umbilical cord, and the membranes which surround the infant during development. Normally the afterbirth should be expelled shortly after the birth of the infant.

**Afterdamp,** "BLACKDAMP," OR "CHOKEDAMP." Carbon dioxide arising: from the slow oxidation of coal without fire; from fire at the coal face; or from an explosion of a mixture of air with either coal dust or Firedamp (*q.v.*). It is from this last source that it derives its name. Its chief effect is asphyxiating, owing to oxygen deficiency of the atmosphere containing it. It is poisonous, and may be highly so if combustion is incomplete and appreciable quantities of carbon monoxide are present. It is heavier than air and tends to collect in low lying mine-workings. Improvements in ventilation practice in mines have greatly reduced its potential dangers, and it is now seldom encountered unexpectedly.

**Afterglow.** A faint, broad, high arch of radiance or glow seen occasionally in the western sky during very clear weather, in deepening twilight. Soon after sunset an observer and the air for several thousands of feet above him are in the shadow of the earth which is cast by the sun as it sinks below the horizon. Therefore, at this time, such a glow can be observed only in the upper air above the highest clouds. The delicate and somewhat diffuse coloration, varying from yellow to purple, is caused by very fine particles of dust, suspended in the higher levels of the atmosphere, which tend to scatter the components of white light. It is believed that the "afterglow" begins only when the "purple light" is present in the opposite part of the sky. This afterglow is a similar optical phenomenon to the alpine glow, of which it may be regarded as the second stage, occurring at greater angular distances from the sun than does alpine glow. Usually, the depression of the solar disk below the horizon is from 4° to 9°. See also Alpine Glow; Purple Light.

**Afyon Karahisar.** Town of Turkey-in-Asia, capital of Afyon Karahisar vilayet. It is an important rly. junction, 200 m. E.

of Smyrna (Izmir), and is the centre of an opium-growing district, the name meaning "opium black castle." It manufactures saddlery and carpets. There are several mosques. Its ancient name was Synnada. Pop. (1950) vilayet, 372,566; town, 29,881.

**Afzella.** Tree of the family Leguminosae occurring in tropical E. and W. Africa. It rarely exceeds 70 ft. in height with a buttressed base. The timber is pinkish when freshly cut but darkens on exposure; it is stable, hard, heavy, durable, and is used in the U.K. for good joinery.

**Agade.** An ancient city of Babylonia, near Kish; the exact site is not known. Agade became the capital of King Sargon (*q.v.*) of Akkad and gave its name to the Akkadian dynasty he founded. See Babylonia: History.

**Agades.** Town of French West Africa, occupied by the French in 1906. Capital of the Saharan oasis of Aïr or Asben, in the Niger Territory, it is on the caravan route between French Sudan and Tripoli. There are a meteorological research establishment and an aerodrome here. Pop. (est. 1948) 38,000.

**Agadir.** Atlantic bay, port, and naval air base of French Morocco, 23 m. S.E. of Cape Ghir. Pop. (1954) 30,111, of whom 6,062 were Europeans. In the early years of the 20th century Germany watched with increasing jealousy the growing influence of France in Morocco; and, as the German ambassador to France alleged, to protect German interests in that African country the German govt., in July, 1911, dispatched the gunboat Panther to Agadir—an action, unexpected as a thunderbolt, that brought threat of war to Europe. Negotiations followed, and on Nov. 4, 1911, France and Germany signed a treaty by which Germany agreed that France should have a free hand in Morocco in return for the cession to Germany of rights in some 100,000 sq. m. of territory in the Congo basin.

**Agag.** Amalekite ruler spared by Saul against the divine command and cut to pieces by Samuel at Gilgal (1 Sam. 15, v. 33).

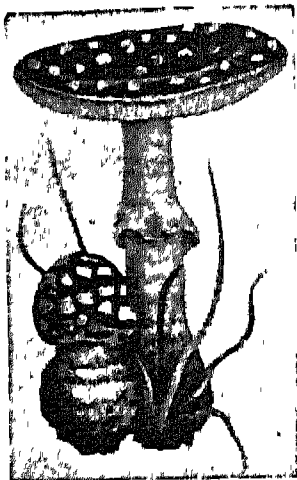
**Agaiambo.** Tribe of mixed Papuan and Melanesian stock in Papua, numbering 83 in 1948. Driven by virile neighbours into the marshland behind Ketakerua Bay, they erected pile-dwellings for themselves and for the pigs which, with waterfowl and fish, formed their animal food. The





Agaric. *Psalliota campestris*, or the common edible mushroom

**Agaric** (Gr. *agarikon*, fungus). General term in botany used to denote numerous species of fungi, including the mushroom. They bear their spores on thin plates or gills on the lower surface of the cap and radiating from the stem.



Agaric. Poisonous kind, the fly agaric

in the Carpathian Mts., it is on the Trotus river, 35 m. W.S.W. of Bacau. Rumanian territory was entered by the Austro-German forces at this point on Oct. 18, 1916.

**Agassiz, MOUNT.** Peak of the Andes, 10,400 ft. above sea level, named after Louis Agassiz. In Argentina, on the Chile border, it gives its name to a prov. in Chile.

**Agassiz, ALEXANDER** (1835-1910). Swiss-born American scientist. Only son of J. L. Agassiz, he was born at Neuchâtel, Switzerland, where his father was professor, and went with him to America in 1849. Graduating at Harvard, 1855, he became its curator at the Museum of Comparative



Alexander Agassiz, American scientist

Zoology, 1874-97. In the interval, as superintendent of copper mining south of Lake Superior, his knowledge of geology, chemistry, and engineering enabled him to develop the mines and to amass a fortune, which he devoted to zoological research. Specialising in marine zoology, he established a marine station on Rhode Island in 1875. His also wrote on coral.

**Agassiz, JEAN LOUIS RODOLPHE** (1807-73). Swiss-born American naturalist. Born at Motier, Switzerland, May 28, 1807, he studied at Zürich, Munich, and Heidelberg, was professor of natural history at Neuchâtel, 1832-46, and an ardent

follower of Cuvier. His work in 5 volumes, *Recherches sur les poissons fossiles*, was published 1833-43, and his scientific investigation of the movements of glaciers resulted in *Etudes sur les glaciers*, 1840. After lecturing at Boston, U.S.A., in 1846, he was appointed in 1848 professor of natural history at Harvard, where later he established the museum of comparative zoology. He left his great work on the Natural History of the U.S.A. unfinished. He died at Cambridge, Mass., Dec. 14, 1873. He gave his name to the Agassiz Association, an American society, formed in 1875.



L. Agassiz

**Agate.** Variety of chalcedony (silica) deposited from water, usually presenting a banded or ribbon-like structure due to pauses in its growth. Its hardness makes it suitable for mortars, pivots, bearings in electrical instruments and knife edges in chemical balances. The more delicately banded and coloured varieties are used as ornamental stones. The name is said by Pliny to be derived from Achates, a river in Sicily, where it was originally found.

Agates may be classed as semi-precious stones. When the bands are fairly regular the stones are known as ribbon-agates. Onyx is a ribbon-agate with cloudy white bands alternating sharply with black bands. In cornelians white alternate with red, and in sardonyx with brown. Moss agate, or mocha-stone, has beautiful moss-like patches of a fibrous mineral. The choicest varieties are found in India, Uruguay, Southern Brazil, and Bohemia. Scotch pebbles are pretty agates found chiefly in Angus and Perthshire.

**Agate, JAMES EVERSHED** (1877-1947). British author and critic. Born at Manchester, Sept. 9, 1877, he was educated at Giggleswick and Manchester grammar school. He was appointed dramatic critic of the Sunday Times in 1923. His many publications include a sequence of autobiographical volumes with the general title of *Ego* (1935 onwards): these form a valuable record of events and personalities in literary, theatrical, and social life. Died June 6, 1947.

**Agatha** (d. 251). Saint, virgin and martyr. Sicilian by birth, she suffered martyrdom under Decius at Catania, after having been tor-

tured by the praetor Quintianus, whom she repulsed. She was canonised by Pope Gregory I. A chapel in Catania cathedral is dedicated to her, and her festival is kept on Feb. 5. Her name is in the Church of England calendar.

**Agathocles** (361-289 B.C.). Tyrant of Syracuse. Of humble birth, he entered the army as a common soldier, but having married the widow of his wealthy patron Damas, became the richest man in Syracuse. Expelled from the city by his enemies, he returned with a band of mercenaries and was besieged in Syracuse 310 B.C., but triumphantly carried the war into the enemy's country in N. Africa. Henceforth (307 B.C.) he was king of all Sicily. His success-



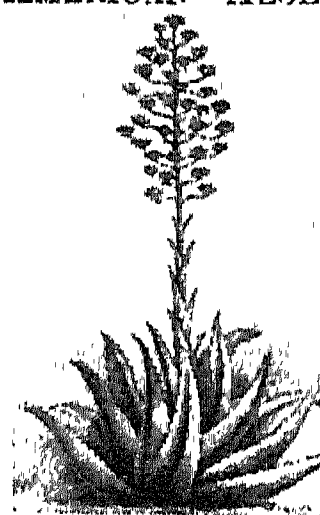
Agathocles, Tyrant of Syracuse  
Bust in National Museum, Naples

ful campaigns against the Bruttii in Italy and the people of the Lipari islands consolidated his rule.

**Agathon** (c. 447-400 B.C.). Athenian dramatist, a pupil of Gorgias and a friend of Plato and Euripides. Only fragments of his tragedies have survived, but the Alexandrian critics assigned him a high place. He wrote *The Flower*, the first Greek drama with a plot not based on a subject from mythology. Agathon was also the first to make his choral odes mere lyrics having no connexion with the theme of the play.

**Agau.** See Agao.

**Agave** OR AMERICAN ALOE. Plant so called from a superficial likeness to the true aloe, to which it is not related, the agave being an amaryllid, while the aloe is a lily. There are many species of agave, all natives of S. America,



Agave, or American Aloe

the mechanism of age-hardening remain the subject of controversy.

**Ageing.** Process, natural or artificial, whereby the properties or characteristics of materials are changed after a longer or shorter period of time. In rubber by perishing, in metals by fatigue, or in wood by decay, it is detrimental. In other materials it may be beneficial and be produced artificially. In alloys such as those of aluminium there is a period of age-hardening which can be hastened by heat or other treatment. Chemical changes due to the passage of time can be speeded up, as in the increased absorption of oxygen in varnishes, oils, rum, etc., by standing in open vats. Whisky is aged, or matured, by oxygen under pressure. In calico dyeing and printing, ageing machines are employed. The weathering of clay for brick and pottery making is a form of ageing. Iron used in electro-magnets in electrical machinery and transformers suffers an ageing loss which is considerably reduced by the use of special silicon alloys of iron, such as stalloy. Concrete hardens after a certain time and this is referred to as ageing or curing. See Alloy.

**Agen** (anc. Aginnum). City of France. Capital of the department of Lot-et-Garonne, it is 70 m. S.E. of Bordeaux, on the Garonne (which is not navigable here) and the Canal du Midi. It has an aerodrome. A bishop's see, it has a 12th-century cathedral, and many old buildings and institutions. It is noted for dried prunes. Tobacco, maize, wheat, and rye are grown in the district near by; the town has mechanical engineering and feather and down dressing works, and makes pumps, enamelled steel vats, and men's clothing. It was the birthplace of the scholar Joseph Scaliger, the poet Jasmin, and of Lacépède the naturalist. Bernard Palissy, the 16th-century potter who created the ceramic industry in France, was born in the diocese. Pop. (1954) 32,593.

**Agency.** Term formerly used to designate a group of princely states in India administered by a British official agent.

**Agent.** In law, one who acts for and on behalf of another (the principal) in such a way as to make the principal legally liable for his acts and defaults.

As between principal and agent, the rights and liabilities depend on the agreement between them; but when an agent acts for his principal, the latter is bound by his

acts if they are within "the scope of his authority." By this phrase is meant that an agent of a particular class is supposed to have authority to do those acts which such an agent usually has. Thus, if a commercial traveller accepts an order for goods at £2 a ton, or on the terms of three months' credit, his principal is bound by these terms, although the traveller may have been told not to accept orders at less than £3 a ton, and to give no credit. Partners are agents for the other partners in all ordinary matters relating to the business in which they are jointly engaged.

By the doctrine of ratification, if a person purports, without authority, to act for a principal, the principal may, on learning what has been done, ratify the agency, and take the benefit and assume the burden of what has been done in his name. If, however, he refuses to recognize it, the agent is personally liable, or what is called a "warranty of authority." A wife, living with her husband, is his agent to pledge his credit for household necessities, including clothing for herself and the children suitable to her husband's station in life. The authority of an agent is revoked by the death or bankruptcy of the principal. It may also be expressly revoked at any time by the principal. And if an agent is engaged, say, for three years, and the principal revokes his authority at the end of one year, the revocation is good, though the agent may still have the right to bring an action for wrongful dismissal.

An agent is entitled, in the absence of express agreement, to the customary remuneration for his services, or, if there is no customary sum, to a reasonable amount. He must not accept remuneration from anybody but his principal, and may not make any other profit. If he does, he forfeits the right to remuneration. He is entitled to be reimbursed and indemnified for all acts done and expenditure incurred within the scope of the agency. He is liable for negligence in the conduct of his principal's business, and is bound to display all the skill and diligence necessary and usual in such agencies. Thus a solicitor must take the proper steps in an action at law; an accountant must be accurate in an audit; a stockbroker must know the prices on the Exchange. Agents on particular markets (e.g. brokers on the London Stock Exchange) can bind their principals according to the customs of those markets.

A principal is liable for the negligence or other wrongful acts of his agent if they are within the "scope of his authority."

**Agent-General.** Title used by the business representatives in London of four of the provinces of Canada (Alberta, British Columbia, Ontario, and Saskatchewan) and the six states of Australia. An agent-general has offices for the transaction of his duties.

**Agent Provocateur** (Fr., agent provoker). An agent or representative, usually of the state, whose duty it is to induce persons to commit offences and then to inform against them and give evidence against them at their prosecution. Agents provocateurs are frequently used in police states to detect revolutionaries. In the U.K. their use is not in general approved of, but during the Second Great War they were occasionally used to detect offences against the rationing regulations.

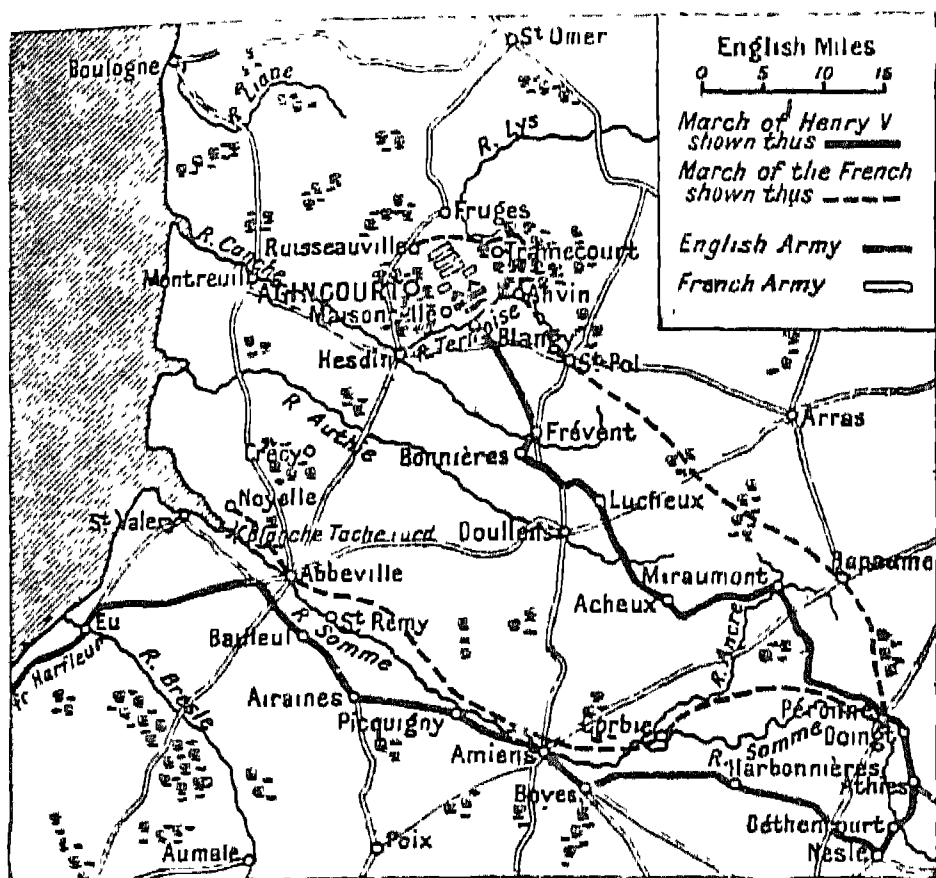
**Agesilaus II** (c. 442-360 B.C.). King of Sparta. Though lame and of insignificant appearance, he was one of the ablest generals of his time. An appeal from the Greeks of Asia Minor for help against the Persians led him to declare war against Persia. After a victory on the Pactolus in 396 he was preparing an expedition into the interior of the Persian empire, but was obliged to return to defend Sparta against a coalition of Athens, Thebes, Argos, and Corinth. The coalition was beaten (394) at Coronea in Boeotia.

Thebes, however, gradually increased in power, and in 371 Sparta was defeated at the battle of Leuctra, and might have suffered extinction but for the efforts of Agesilaus. This danger lasted until the death of the Theban leader Epaminondas, at the battle of Mantinea, in 362. In 361 Agesilaus led an expedition into Egypt to assist King Tachos against the Persians, but died in the following year.

**Aggershus** OR AKERSHUS. Amt or county of S.E. Norway, between Sweden and Oslo Fiord. It has several lakes, and an area of 1,895 sq. m. Oslo is the capital. Pop. (1946) 170,133. The fortress of Aggershus stands at the head of Oslo Fiord, on a headland dividing the harbour of Oslo into two parts. Erected in the 13th century, it was a royal residence down to the 18th century, then became a prison and arsenal.

**Agglomerate** (Lat. *agglomerare*, to form into a mass). In geology, name of deposits formed





Agincourt. Map showing the route followed by the English and French armies before the great battle of Oct. 25, 1415

led Henry to order all but the commander among his prisoners to be killed.

The number of English engaged may be put at about 9,000, of whom only a few hundred were lost. Estimates of the French force vary between 60,000 and a more probable 30,000; they may have lost 8,000, including 1,000 prisoners. Consult *History of the British Army*, J. W. Fortescue, vol. I, 1910.

**Agira.** Town of Sicily, in the province of Enna, formerly called San Filippo d'Agirio. On the site of the ancient Agyrium, it is 35 m. N.W. of Catania, and is one of the oldest cities of Sicily, noted for its marble. Diodorus Siculus, the Greek historian and traveller, was born here. During the Second Great War Agira was the centre of violent fighting, changing hands several times between July 29 and Aug. 3, 1943, when the Canadians finally captured it. There is a memorial here to the Canadians who fell in Sicily. Pop. (1951) 16,167.

**Agistment.** Contract in English law under which one person (the agister) allows another person for some payment to put cattle on the agister's land to graze. The agister must take reasonable care of the animals. Except in certain circumstances, agisted cattle cannot be distrained for rent.

**Agitators** OR ADJUTATORS. Name, merely meaning agents, given in 1647 to the representatives chosen by the New Model Army to present the grievances of the soldiers to the generals and to parliament. Their pay was heavily in arrears, and there were rumours that they were to be disbanded or sent to Ireland. The agitators, who

belonged to the rank and file, acted with—were in fact used by—the council of officers to resist the arbitrary acts of the Long Parliament; they obtained some money, but their main grievances were not redressed. The combined council sent Cornet Joyce (himself an active agitator) to seize the king at Holmby House. The army marched on London, availing itself of dissension between parliament and city to establish its own power, which was immediately assumed by Cromwell. He ordered a discontinuance of the agitators' meetings, and they ceased to exercise influence, although their ideas found continuing expression among the Levellers (*q.v.*) who succeeded them. (See also *Agreement of the People*.) The form adjutators arose from confusion with adjutants. Nowadays the word agitators is applied to demagogic political or industrial trouble-makers.

**Agnano.** Former lake of Italy, drained in 1870. Situated 3 m. W. of Naples, it is in the crater of an extinct volcano; in the centre are the principal thermal establishments. Near by are the sulphurous vapour baths of San Germano and the Dog Grotto.

**Agnate** (Lat. *ad*, to; *natus*, born). Term first used in Roman law to describe persons related through descent from a common male ancestor. Cognates are persons related through both male and female ancestors. The distinction in law, important because succession to property depended upon it, was abolished by Justinian.

**Agnatha.** Major group of animals with backbones. Without jaws and in other respects showing a primitive grade of structural organization, they are represented by a number of fossil forms, called collectively Ostracoderms, which lived in fresh waters in Silurian and Devonian times (c. 350 million years ago), and by the living Lampreys and Hag-Fish (*q.v.*). The fossil agnathians are the earliest vertebrates to be well preserved as vessels. They were small fish-like creatures with a complete armour of bone, but lacked jaws.

**Agnel** (Latin *agnellus*, little lamb). French gold coin struck in the reign of Louis IX (1226–1270), and not minted after 1574. It bore upon one side the emblem of the Paschal Lamb.

**Agnes** (d. 306). Roman saint, virgin, and martyr. She was beheaded at the age of 13 under Diocletian, and is commemorated on Jan. 21.

In his poem *The Eve of St. Agnes*, Keats refers to customs by which the saint was honoured as patroness of young girls. A church in Rome is dedicated to her, her name is retained in the Church of England calendar, and her martyrdom is the subject of paintings by Tintoretto and other artists.

**Agnesi, MARIA GAETANA** (1718–99). Italian mathematician and linguist of remarkable precocity. She was born, May 16, 1718, at Milan, daughter of a professor of mathematics at Bologna. At the age of nine she composed a thesis in Latin advocating the pursuit of learning by women; at 13 she knew Greek, Hebrew, and several modern languages. She displayed equal precocity in mathematics, being the author of two volumes on the analysis of finite quantities and the analysis of infinitesimals, not published until she was 30, and not translated into English until 1801.



Maria Agnesi, Italian mathematician

By the authority of Pope Benedict XIV she took her father's place as professor of mathematics and natural philosophy at Bologna on his illness in 1750. After his death in 1752 she entered a sisterhood at Milan, where she became a nun. She died Jan. 9, 1799.

**Agnew.** Family of art connoisseurs. Thomas Agnew (1794–1871), founder of the firm of Thomas Agnew and Sons, was mayor of Salford in 1851. Under the control of Sir William Agnew (1825–1910), 1st baronet, and his brother Thomas (1827–83), the reputation of the house increased; it was maintained by William



Agnel. French coin: original size

rounded by walls 1½ m. in circumference and 70 ft. high, and containing the palace of Shah Jehan; and beyond the city to the E., the Taj Mahal (*q.v.*), completed by Shah Jehan in 1650 as a tomb for his favourite wife. Among many mosques and palaces the Moti Masjid and Jama Masjid are notable. Buildings put up during British rule include the government house, a medical and a teachers' training college, and barracks. An affiliating and examining university was set up in 1927.

Agra is a busy commercial centre, manufacturing cotton, lace, shoes, carpets and mosaics, and serving as a market for wheat, barley, rice, tobacco, and sugar grown in the district.

Under the Moguls, from 1566 to 1658, it was the virtual capital of India; and under the British in the 19th century it was capital of the North-West Provinces until superseded in 1861 by Allahabad. During the late 18th century it was captured successively by Jats, Mahrattas, and Muslims. It fell to Lord Lake in 1803. During the Mutiny of 1857 it was besieged for several months.

**Agram.** German name of the Yugoslav town of Zagreb (*q.v.*).

**Agrapha** (Gr. *agraphos*, unwritten). Word used for reputed sayings of Jesus Christ not found in the Gospels and for certain sayings that, found therein, are thought to be interpolations. They include the sayings in Acts 20, v. 35, and 1 Cor. 7, vv. 10-12, and those found on papyrus at Oxyrhynchus by Grenfell and Hunt in 1897 and 1904, the genuineness of most of which is questioned. See Logia.

**Agraphia** (Gr. *a*, not; *graphein*, to write). A form of aphasia (*q.v.*) in which there is an inability to

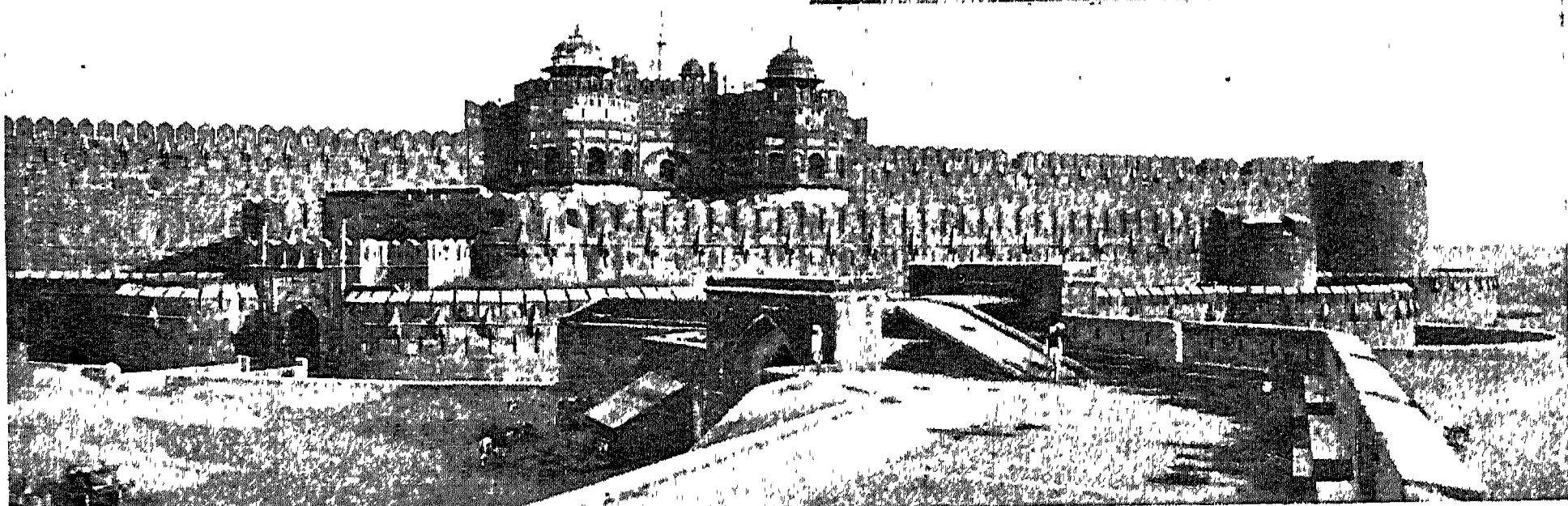
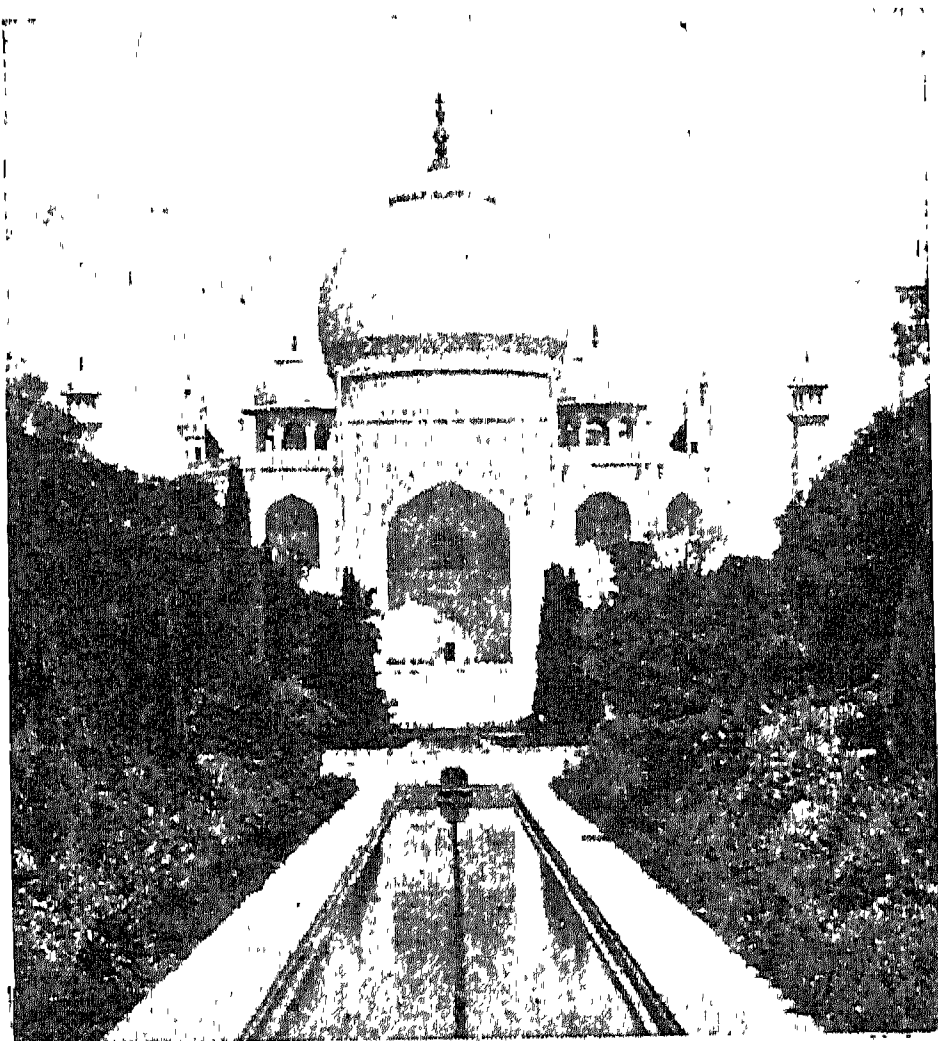
communicate or understand ideas in writing. The patient may understand spoken words but not written or printed, though he has ordinary speech. It is a defect of the mental processes, due to brain damage, usually from apoplexy.

**Agrarian Laws** (Lat. *agrarius*, relating to land). Roman laws, the object of which was to ensure a fair distribution of the state domains (*ager publicus*, public land). These state domains, chiefly territory taken from conquered enemies, were from the first in the hands of the patricians, who paid at first a moderate rental, but later none at all. They remained state property, though holders could bequeath and sell them. The claim of the plebeians to a fair share of the land they had helped to win led to bitter struggles. By the Licinio-Sextian laws (367 B.C.) each person's holding was limited to 500 *jugera* (about 300 acres), and there were restrictions in regard to pasture-land. For a time this worked well, but the great wars ruined the small owners and led to the growth of large farms worked by slave labour, which, in the judgement of Pliny, "ruined Italy."

The Sempronian law (133) of Tiberius Gracchus imposed a maximum limit of 1,000 *jugera* for a single family, all in excess of this being broken up into

small allotments for the poor, inalienable, and leased from the state at a small rental. The still more radical proposals of Caius Gracchus in 123 were rendered valueless by that of Marcus Livius Drusus (122), which became law, legalising alienation of the holdings, which thus again passed into the hands of the wealthy. The Thorian law (119) assigned state domains as private property to holders on payment of a tax (later remitted). This put an end to all distribution of land among the poorer classes and destroyed the lower-class landed proprietors. No agrarian laws are heard of under the empire. See Latifundia.

**Agrarians.** Term applied generally to those interested in agriculture and to the agricultural population; specially applied to a political party in the second German empire, originating in 1876 as a society for the reform of taxation. When foreign corn began to



Fort and Delhi Gate of the city of Agra. The fort, which was built by Akbar in 1566, when Agra first became the capital of the Mogul Empire, is surrounded by walls a mile and a half in circumference and 70 ft. high. Above:

View of the Taj Mahal, the beautiful and famous building which stands to the east of the city  
**AGRA: AKBAR'S MASSIVE FORTRESS WALLS AND THE FAMOUS TAJ MAHAL**



**Agricultural Holding.** In Great Britain, the aggregate of agricultural land comprised in a tenancy not being a tenancy during the continuance of an office, appointment, or employment held by the tenant under the landlord. Agricultural land is land used for agriculture in the way of a trade or business. Agriculture includes not only what is normally called farming, but activities such as fruit growing, livestock breeding and keeping, market gardening, and nursery gardening. The tenancy must be for years or from year to year and, with certain exceptions, a tenancy less than from year to year takes effect as a tenancy from year to year.

Agricultural holdings farmed in Great Britain in 1954, sometimes more than one by the same farmer, and their size are shown in the table.

AGRICULTURAL HOLDINGS IN GREAT BRITAIN, 1954

<i>Extent of Holding</i>	<i>England and Wales</i>	<i>Scotland</i>	<i>Total</i>
Under 5 acres .. .. .	82,688	17,153	99,841
5 to 50 acres .. .. .	155,607	32,097	187,764
50 to 100 acres .. .. .	59,805	9,919	69,724
100 to 150 acres .. .. .	30,990	5,755	36,745
150 to 300 acres .. .. .	33,393	6,482	39,875
Over 300 acres .. .. .	12,880	2,184	15,073
Grand Total .. .. .	375,432	73,590	449,022

The holdings listed do not include those consisting solely of rough grazing or only of mountain and heathland.

Under the Agriculture Act, 1947, which consolidated certain earlier acts, such tenants are given security of tenure. The act does not cover all points arising between a landlord and a tenant; a great deal is left to the "custom of the country." Such customs may vary not only from county to county but also from district to district, and from time to time. But a custom may be excluded by the contract of tenancy, whereas any provision in a contract inconsistent with the provisions of the Agriculture Act relating to agricultural holdings is void.

The act is designed to promote good husbandry. The improvement of land is a slow process, and it is essential that a tenancy should be for a lengthy period so that the tenant may look ahead and be induced to carry out improvements to the land even though it may be years before any benefit can accrue from them.

The act contains two main sets of provisions designed to achieve its object. First, in order to give the tenant security of tenure, his

tenancy can be ended only on long notice; second, even if the necessary notice is given, the tenant is entitled to be compensated by the landlord for: (1) certain improvements carried out to the land; (2) any loss or expense caused to him by having to leave the land.

**SECURITY OF TENURE.** Notwithstanding any provision in a contract of tenancy to the contrary, a notice to quit, whether given by landlord or tenant, cannot terminate the tenancy before 12 months from the end of the then current year of the tenancy. There are a few exceptions, *e.g.* when a receiving order in bankruptcy is made against the tenant.

Moreover, if a tenancy is granted for two years or more, the tenancy will not expire automatically at the end of the period for which it is granted. In order to end it the landlord or tenant

must serve a written notice to quit at least one year before the tenancy is due to end. The tenant who receives a notice to quit is also given further protection. If within one month he serves a counter-notice, the notice to quit will have no effect unless the minister of Agriculture and Fisheries consents for certain reasons, among which are bad husbandry by the tenant certified by the minister of Agriculture.

**COMPENSATION FOR IMPROVEMENTS.** The tenant may also be entitled to compensation for certain improvements made in the holding; but the exact nature of his rights will depend on the date when the improvement was made, and in some instances it will be necessary for the landlord to have consented to the improvement before it was carried out, in others he must have been notified of what was being done.

**COMPENSATION FOR DISTURBANCE.** When a tenant is compelled to leave his holding, even on proper notice, he may be entitled to compensation for disturbance. The amount of compensation due is the loss or expense caused to the tenant in connexion with the sale or re-

moval of his household goods, implements, fixtures, farm produce, and stock; but to avoid dispute the amount is computed at one year's rent unless the tenant proves that his loss and expenses exceed that amount. The maximum obtainable is two years' rent.

The tenant has no right to compensation for disturbance in certain circumstances—*e.g.* if the minister of Agriculture has given a certificate of bad husbandry.

A tenant may in certain circumstances be entitled to compensation for damage done to his crops by game, and is also entitled, subject to certain conditions, to remove at the end of his tenancy fixtures, such as engines or fencing, affixed to the holding by him. The landlord's right of distress is limited.

Some of the provisions of the act are slightly modified in their application to market gardens.

During the Second Great War it became necessary in the U.K. to plough much land which had not recently been used as arable. The urgent need for food also made it necessary that land should be cultivated very intensively, and this often involved a wide departure from long-established agricultural practice. The ministry of Agriculture was therefore given the widest and most absolute powers, many of which were delegated to the county war agricultural executive committees appointed by the ministry to replace the peacetime agricultural committees of the local councils. After the war ended, extensive powers were retained by the minister to ensure efficient farming. He may in certain circumstances place the owner or occupier of agricultural land under supervision, give him directions or dispossess him, or acquire the land compulsorily.

**COUNTY AGRICULTURAL EXECUTIVE COMMITTEES.** In each county there is a county agricultural executive committee set up by the minister to whom any of the duties of the minister under any act relating to agriculture may be delegated. Among the powers delegated is that of taking possession of land where the occupier has been required either to farm it himself or let it to an approved tenant and has failed to do either; consenting to notices to quit; and making and revoking suspension orders. A county agricultural executive committee consists of not more than five members

# AGRICULTURE: HISTORY AND PRINCIPLES

LORD BOYD ORR, Director-General U.N. Food and Agriculture Organization, 1946-48

*This general article surveys the development, social, economic, and administrative, of mankind's most essential industry from primitive times to the age of mechanisation and scientific research. For information on methods, see Cattle; Dairy Farming; Farm; Ley Farming; Pasture; Poultry; Sheep, etc.; also articles on Crops; Food and Nutrition; Food and Agriculture Organization; Manure; Root (Crops), etc.*

Agriculture (Latin *ager*, a field; *cultura*, tillage) is the basis of civilization. Primitive man depended for his food on natural vegetation and the chase, and hence human society was limited to small tribes moving from place to place in search of food. The development of agriculture led to the permanent settlement of communities in the areas where food was grown and so to the rise of cities with a relatively secure food supply all the year round, making possible conditions favourable to discovery and invention, with resulting growth of civilization. Agriculture continues to be the foundation on which civilization rests. The products of the soil, e.g. food and raw material for clothes and many other commodities, still supply the primary necessities of life and exceed in value the products from all other sources.

Even with the great development of other industries, there are still more people in the world engaged in agriculture than in all other occupations put together. Nor is there any likelihood that the importance of this basic industry will decrease, at least in the immediate future. The carrying-out of the recommendations of the United Nations Food and Agricultural Conference of 1943 was to involve doubling world production of the more expensive agricultural products. This would have far-reaching social and economic consequences.

## Prehistoric Agriculture

The beginnings of cultivation and the domestication of animals occurred some time between 20,000 and 10,000 B.C. It may be assumed that the use of grain as food occurred earlier. Wheat grew wild in Eastern Asia and in the great Mediterranean Valley, now the Mediterranean Sea, and it is most probable that primitive man learned to knead and pound the seeds for food long before he learned to grow it. The origin of cultivation was the discovery that seeds buried in the ground reappeared as living plants bearing seeds of the same kind. This new conception must have had a profound effect on the myth-making mind of primitive man. Rituals

became associated with seedtime and harvest. Among the Neolithic peoples, sowing was traditionally associated with the offering of a human sacrifice, usually of the finest youth or maiden in the tribe.

For many centuries progress in cultivation was slow. About 5000 B.C. a rapid development began in both Egypt and Mesopotamia. The earliest actual evidence of systematic cultivation consists of wheat grains found in pre-dynastic tombs in Egypt and early Sumerian dwellings in Mesopotamia, dating in both cases from about 3000 B.C. The Sumerian grains are assigned by experts to be the highly developed species of *Triticum compactum*, thus indicating that even by this time selection of seed for the improvement of the crop had been already well established. It is probable that artificial irrigation was practised as early as this.

## Egypt, Greece, Rome

By the time of the Egyptian Old Kingdom (c. 2750 B.C.) and that of Hammurabi in Babylonia (c. 1790 B.C.) agriculture had become a highly developed industry. The stone axe used as a crude hoe and other primitive tools had been replaced by ploughs, seed drills, and other agricultural implements not unlike those used in the most advanced countries until about the 18th century. In Egypt the main crops were wheat, barley, millet, peas, beans, and edible roots. The principles of manuring were understood and practised. Cattle were selected for breeding. The land was divided into great estates worked by slaves. In Biblical times the Israelites were a great agricultural nation. The land was regarded as being held direct from Jehovah. It was parcelled out among 600,000 occupying owners, and the holdings could not be alienated by debt. The land was well watered by irrigation and enriched with manures. It is described in 2 Kings 18, v. 32 as a land of "corn and wine, a land of bread and vineyards, a land of olive oil and honey."

An account of agriculture in Greece is given by Theophrastus (c. 372-288 B.C.), the first writer on botany. He describes the mix-

ing of soils, manuring, and other agricultural projects in vogue in his time. In the 5th century B.C. more than half of the Athenian citizens were owner-occupiers. A normal-size farm included about 30 acres of arable land, 4 or 5 acres of vines and olives, and some orchard and pasture. In addition to these farms a large number of agricultural labourers were the holders of small plots.

Roman agriculture is described by Cato, Varro, and Virgil (2nd and 1st centuries B.C.). In certain areas there was a tendency to specialise, e.g. in the olive or the vine. As Roman conquest spread, grain was brought from Sicily, Sardinia, and Africa to feed the growing population of the city of Rome, but Italy itself continued to produce a good deal of grain. Periodically small farms were merged into large grazing estates (*latifundia*) worked by slaves. This was very pronounced after the devastation of the Hannibalic war, but was reduced by the widespread settlement of ex-soldiers on the land during the first century B.C. In the middle and later Empire the vast personal estates of the Emperors, swollen by confiscation, were worked by farmer-serfs tied to the soil. In the early days of the Republic a high proportion of the citizens of Rome were working farmers. Typical of that period were the 150-acre farms worked by the owner with a bailiff and slaves. The Romans fallowed the land to rest it and rotated with legumes to enrich the soil, irrigated the land, and improved by selection of seed.

## The Middle Ages

After the fall of Rome agriculture deteriorated, and throughout the Dark Ages in Europe both the science and practice of the industry were at a lower level than that which was attained in the Mediterranean civilization at the beginning of the Christian era. A notable exception was found in Spain, occupied by the Moors. There agriculture reached probably the highest level which had ever been attained by that date, a level not surpassed by any Western European country until the 18th century. An account of the science and art of farming in



century, continued and reached its peak between 1700 and 1845. The enclosures caused serious discontent among the villagers deprived of their land. In some districts they revolted. A serious revolt occurred in East Anglia in 1549. When the enclosure was carried out by holders who collected the strips into one unit by agreement, the development was beneficial and there was no discontent. Indeed, the change from the wasteful open-land cultivation in strips to enclosed fields was essential to the development of modern efficient agriculture. But the enclosure of common lands and the eviction of peasants with inadequate or no compensation for the sake of the profits to be made from sheep has been condemned by most writers. Hundreds of Acts of Parliament dealing with enclosures were passed, most of them promoted by landlords to legalise their action. In 1845 an Act was passed which was designed to safeguard the interests of peasant-holders, but by that time it was almost too late, for practically all the agricultural land in the country had already been enclosed.

Enclosed fields under the continuous control of one individual made possible the carrying-out of experiments with improved methods. Early in the 18th century a number of landlords began



Agriculture. Jethro Tull (1674-1741), who gave up his career at the bar to study and practise farming  
*Royal Agricultural Society*

experimenting with new crops and new methods of cultivation, and in the 18th and 19th centuries agriculture, which up to the end of the 17th century had changed little since the Dark Ages, underwent a revolution almost as drastic as the Industrial Revolution.

#### New Men and Methods

The first great pioneer was Jethro Tull. He showed that the yield of crops could be increased by proper cultivation to eradicate weeds. He is also credited with

inventing the seed drill to replace the wasteful method of broadcast sowing. A primitive form of seed drill, however, was in use long before his time. More important innovations were introduced by Lord Townshend, who left politics in 1727 to devote himself to the improvement of his estate in Norfolk. He introduced artificial grasses and clovers and the turnip crop and showed that a rotation of crops, *e.g.* wheat, turnips, barley, and clover, kept the land in better condition than the old wasteful method of leaving land fallow for a year.

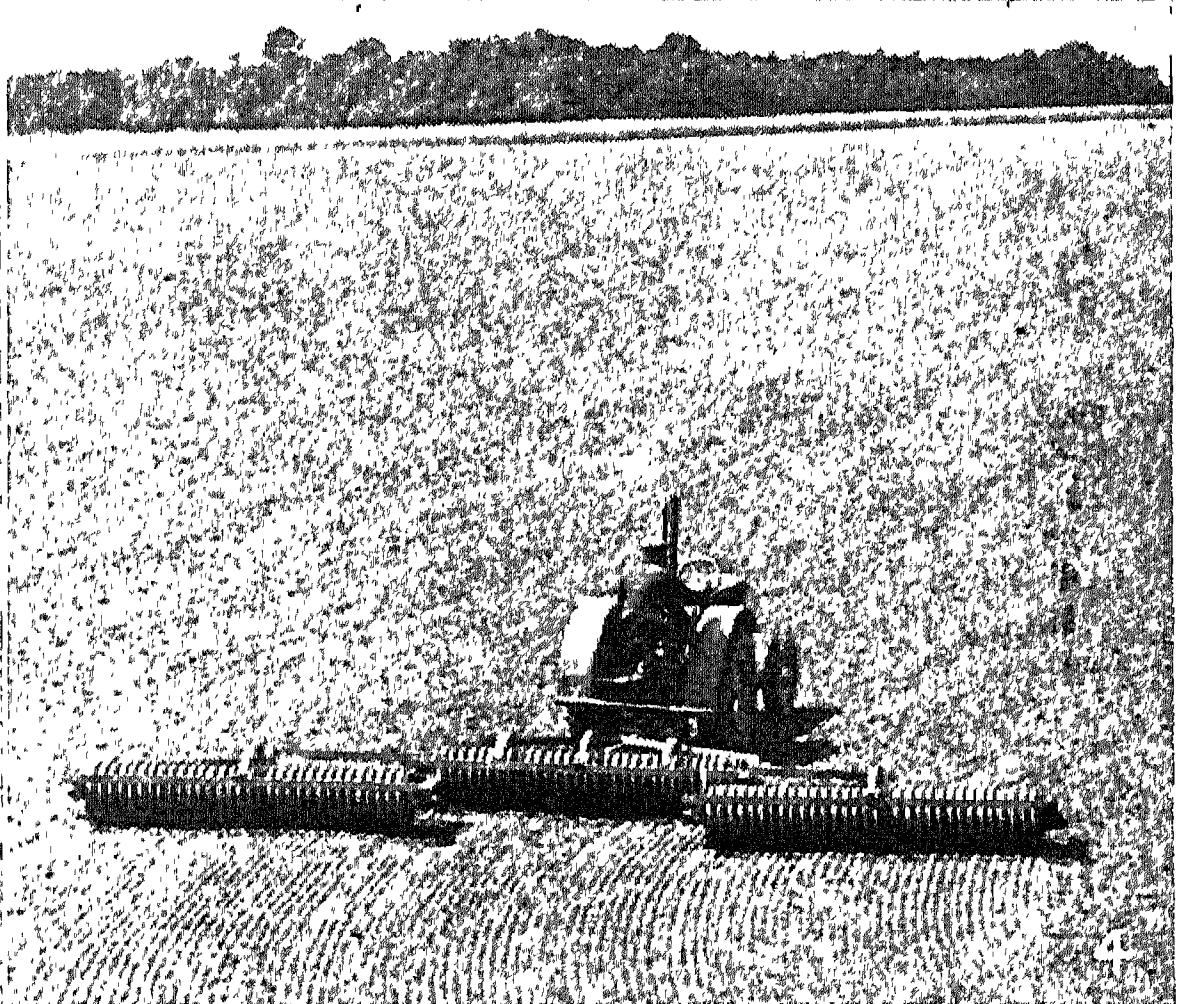
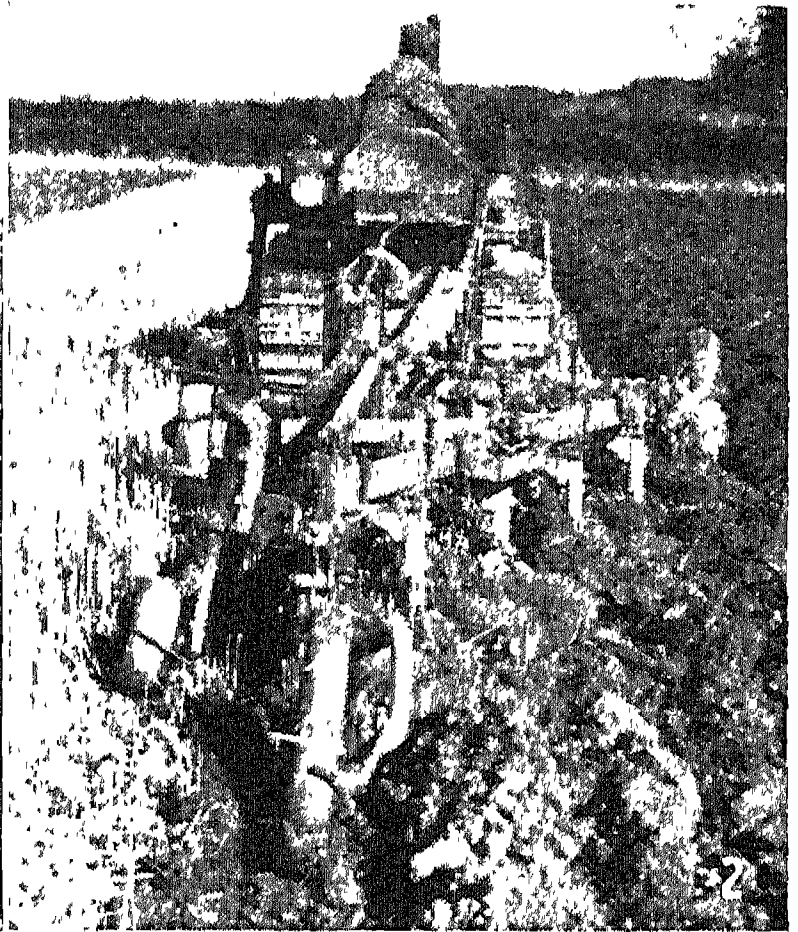
The improvement in pastures and the use of turnips for winter feed was followed by a remarkable increase in the weight of cattle and sheep. The average weight of cattle rose from about 350 lb. at the beginning of the 18th century to 800 lb. at the end of it, and, of sheep, from 28 lb. to about 70 lb. In Roxburghshire the increase in the size of the cattle fed on the new pastures in summer and on roots and straw in winter was so great that some people regarded them as unnatural "monsters" and were afraid to eat the beef from them.

The improvement in feeding was accompanied by an improvement by selective breeding. Robert Bakewell produced the famous Leicester breed of sheep



Agriculture. These engravings by David Loggan, dating from about 1675, are of the country round Cambridge in pre-enclosure days. The lower view shows corn being reaped by the village farmers, while above is a field from which the crops have been gathered, leaving it free for huntsmen and the peasants' livestock



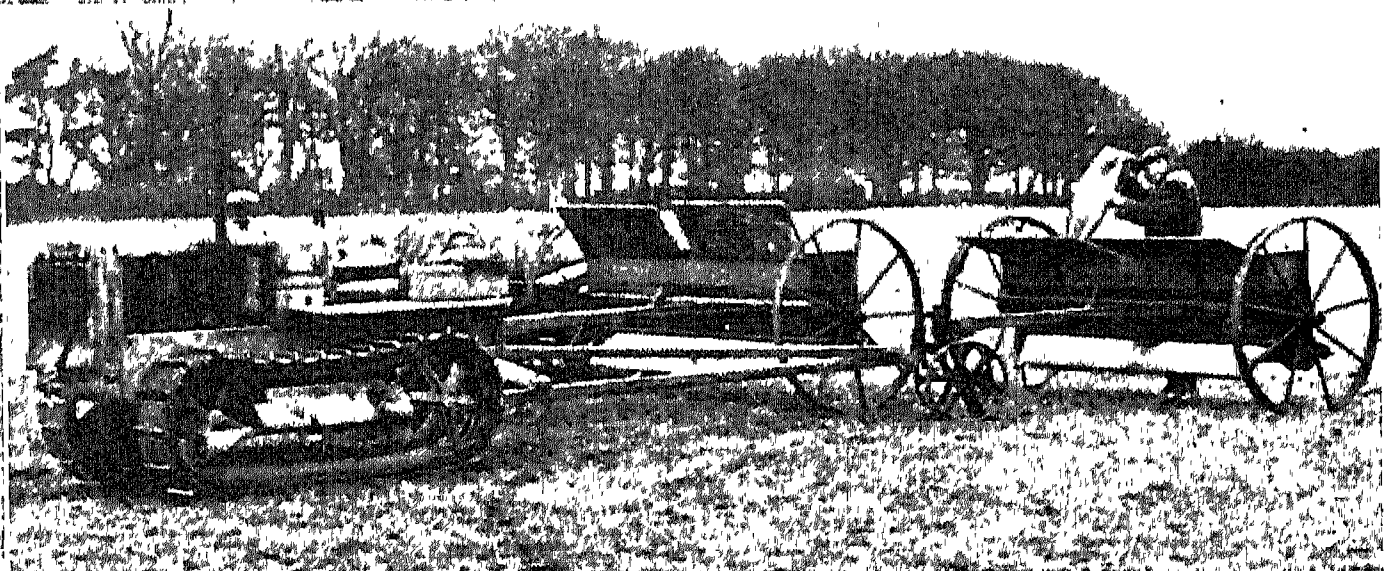
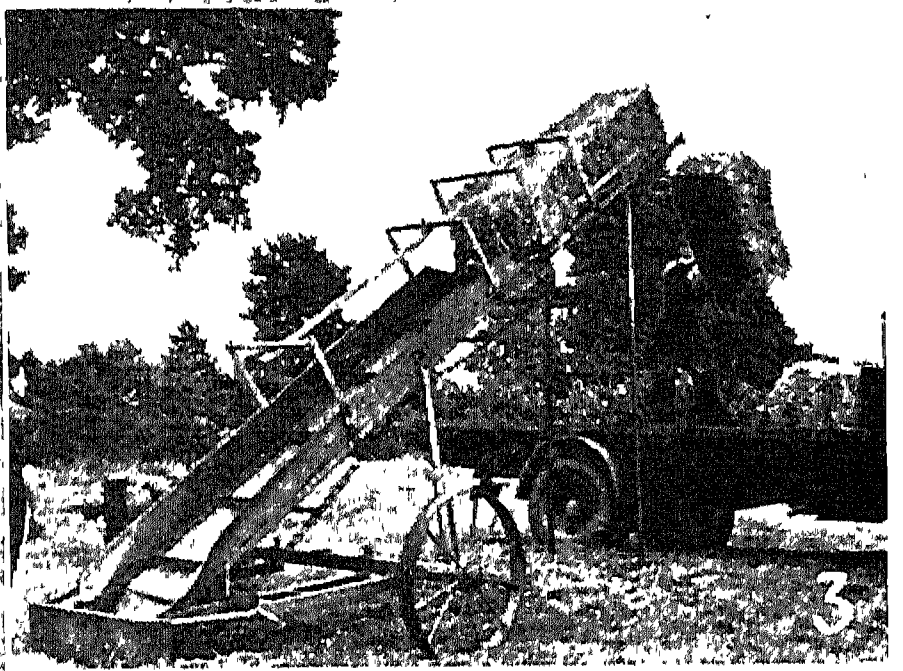
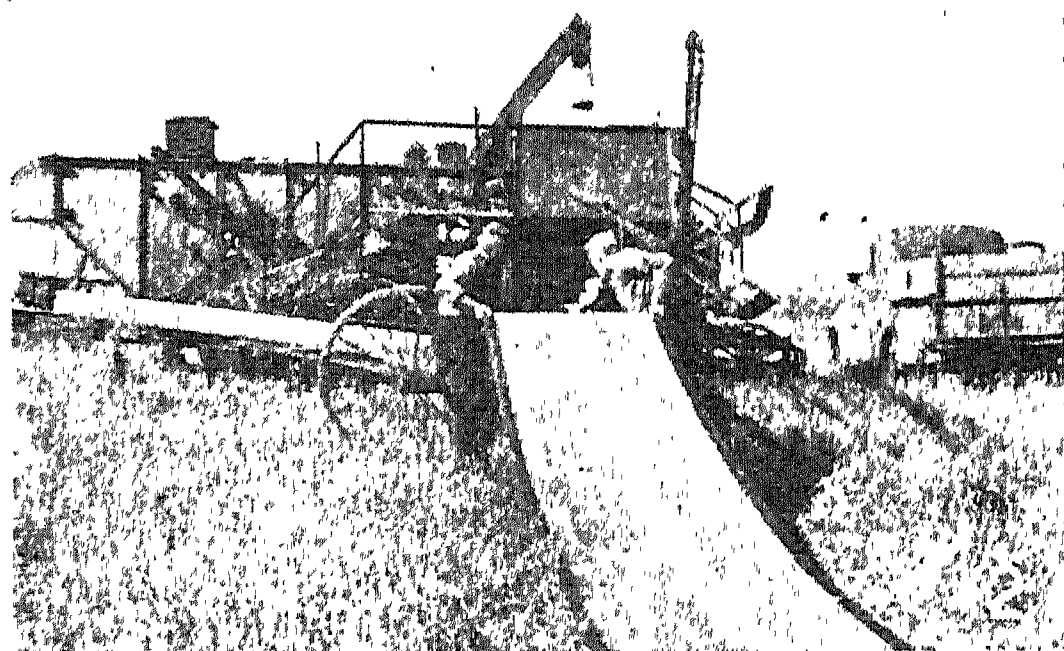
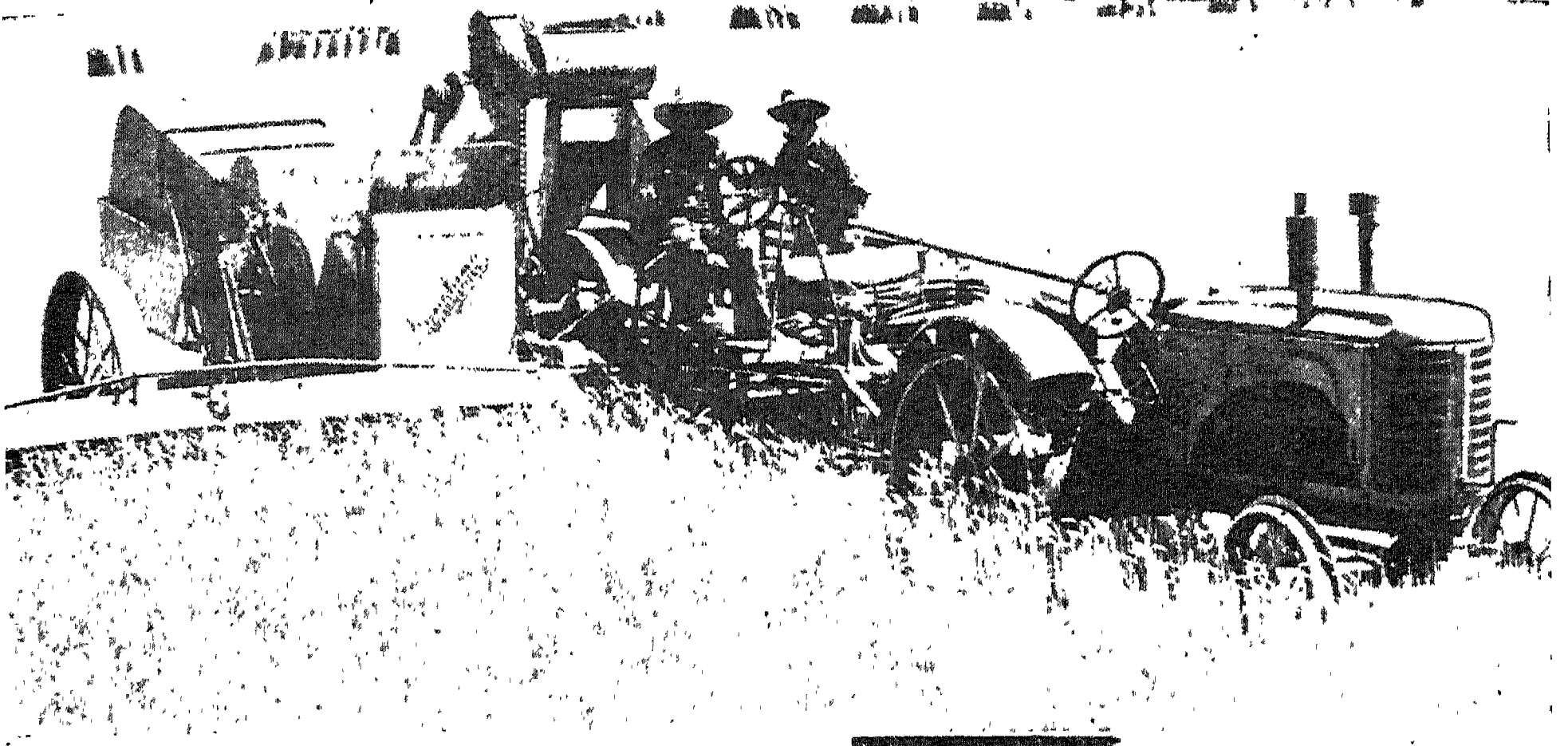


1. Crofter ploughing with a two-horse team near Stornoway on the island of Lewis-with-Harris, Outer Hebrides.  
2. A four-furrowed plough drawn by a caterpillar tractor.  
3. A single roller, horse-drawn, on a Cornish farm.

4. Triple disk-rollers, drawn by a tractor, making a seed-bed on light soil. 5. Laborious hand-watering of a crop threatened by drought. 6. Multiple spray installation watering a field at West Drayton, Middlesex

# **AGRICULTURE : CONTRASTED METHODS BEFORE AND AFTER MECHANISATION**





1. An Australian machine that strips, threshes, and bags wheat ready for sowing. 2. Feeder belt being attached to a combine harvester in Canada. 3. Loader with elevator extension for conveying bales of straw. 4. Self-

propelled rotary hoe used to cultivate a 30-acre field of onions in Australia. 5. A caterpillar tractor and two manure drills: with these machines, 30 acres a day can be manured. 6. Combine harvesters at work in England

#### AGRICULTURE : TYPES OF MACHINERY USED IN TILLAGE AND HARVESTING





Agrippa. Roman general  
Capitoline Museum, Rome

and he conducted successful campaigns in Gaul, Spain, Pannonia, and Syria. Agrippa was responsible for many public works at Rome and was a generous patron of art and letters. He had much to do with the survey of the empire, begun by Julius Caesar and completed under Augustus. His third wife was Julia, the emperor's daughter.

**Agrippina** (d. A.D. 33). Called the Elder, she was a daughter of Marcus Vipsanius Agrippa and Julia, daughter of Augustus. A woman of strong character, she shared the hardships of the campaigns of her husband Germanicus, by whom she was the mother of Caligula and Agrippina, mother of Nero. Her popularity is said to have aroused the jealousy of Tiberius, and she was banished to the island of Pandataria, where she died.

**Agrippina** (c. A.D. 15-59). Called the Younger, she was a daughter of Germanicus by Agrippina the Elder. Her first husband was Gnaeus Domitius Ahenobarbus, by whom she had a son, afterwards the emperor Nero. Later she married her uncle the emperor Claudius and persuaded him to adopt her son, to the detriment of Britannicus, his own son by his former wife Messalina. When Claudius died in 54, it was said he was poisoned by Agrippina. Five years after his accession Nero had her assassinated. Agrippina wrote memoirs (*Commentarii*), now lost.

**Agronomy** (Gr. *agros*, field; *nemein*, to manage). Term applied to that part of agriculture which is concerned with crops. A fully equipped agricultural depart-

ment in a university, or even a farm institute, should employ at least one specialist who is an agronomist.

**Aguada.** Town on W. coast of Puerto Rico, West Indies, 12 m. N. of Mayaguez. Here Columbus is said to have landed in 1493.

**Agua Dulce.** City and seaport of Panama. It is situated on the N. shore of Parita Bay, a W. arm of the Gulf of Panama, and is a flourishing commercial city, with sugar and rum distilling industries. Salt is worked.

**Aguarico.** River of Ecuador. Rising in the Andes, it flows S.E. for 250 m. to join the Napo.

**Aguascalientes** (Span. warm waters). One of the states of Mexico. Centrally situated on the Mexican plateau, it is named after its warm springs. Cereals, legumes, etc., are grown, stock is reared, and lithographic and building stone, copper, lead, iron, silver, and gold are found. It is well watered, salubrious, and has a good rly. system. Area 2,499 sq. m. Pop. (1950) 188,075.

**Aguascalientes.** Capital of Aguascalientes state, Mexico. It is 365 m. by rly. N.W. of Mexico city and has rly. connexion also with Tampico and the U.S.A. About 6,400 ft. above sea level, it has cotton and woollen factories and smelting works, manufactures pottery and tobacco, and exports bullion and hides. There are vast prehistoric catacombs under the city. Pop. (1950) 93,358.

**Ague** (Lat. *acutus*, acute). Name for acute fevers marked by chill, fever, and sweating, and occurring in paroxysms, such as malaria (*q.v.*); others are dumb ague, and brow and face ague.

**Aguecheek, SIR ANDREW.** A comic character in Shakespeare's Twelfth Night (*q.v.*). He is the boon companion of Sir Toby Belch.

**Aguesseau, HENRI FRANÇOIS D'** (1668-1751). French lawyer. Born at Limoges, he became advocate-general in 1690, procurator-general in 1700, and chancellor in 1717, an office he retained, save for two brief periods, until 1750. He died Feb. 9, 1751. A brilliant orator, he did much to reform the administration of justice.

**Aguilar, GRACE** (1816-47). English authoress. Daughter of a Jewish merchant, she was born in London June 2, 1816, and lived mostly in Devon. She wrote in defence of the Jewish faith, but is chiefly noted for her novels, *e.g.* Home Influence, 1847, and The Vale of Cedars, 1850. These dealt sentimentally with domestic life, reflecting a strongly religious temperament. She died while visiting Frankfurt, Sept. 16, 1847. *Pron.* A-ghee'-lár.

**Aguilas.** Seaport and watering-place of Spain, in Murcia province. On the Mediterranean, 40 m. S.W. from Cartagena, it is a rly. terminus, exports iron ore and other minerals, and is the chief outlet for esparto. Pop. 17,000.



Agrippina the Elder. This beautiful example of ancient sculpture has long been traditionally believed to represent the mother of Caligula and grandmother of Nero  
Capitoline Museum, Rome



6,600 sq. m., is chiefly agricultural. Pop. (1951) town, 80,873; dist., 1,410,873.

**Ahmed** (1724–73). Ameer of Afghanistan 1747–73. The son of Sammaun, or Seman, Khan, chief of the Abdali tribe, he served in the bodyguard of Nadir Shah. When, in 1747, Nadir was assassinated, Ahmed was acclaimed ruler; he then changed the name of his tribe to Durrani and founded the dynasty of that name. His wealth, which included the Koh-i-noor diamond, and his military talents helped him to popularity, and he made extensive conquests. He captured Lahore in 1748, mastered the Punjab in 1751, conquered Kashmir, and sacked Delhi, but had to yield the Punjab to the Mahrattas and Sikhs.

**Ahmed I** (1589–1617). Sultan of Turkey. The elder son of Mahommed III, he became sultan in 1603. He carried on unsuccessful wars with Austria and Persia, that against Austria being terminated in 1606 by the peace of Sitvatorok, said to be the first occasion on which the Turks observed the principles of international law in their intercourse with a Christian nation. According to Turkish writers, tobacco was first used in Turkey in his reign.

**Ahmed II** (1643–95). Sultan of Turkey. He was a brother of Suleiman II, whom he succeeded in 1691. The chief event of his reign was the defeat of the Turks by the Austrians, Aug. 18, 1691, at Slankamen.

**Ahmed III** (1673–1736). Sultan of Turkey. Brother of Mustapha II, on whose deposition he succeeded in 1703, he was the first sultan to announce his accession to the European sovereigns. In 1709 Charles XII of Sweden, defeated by Russia at Poltava, took refuge in Turkey, and this led to war with Russia in 1710. The war ended a year later, and by the treaty of the Prut Russia ceded Azov. In 1715 the Morea was seized from the Venetians, but the Turks were defeated by the Austrians at Peterwardein in 1716 and at Belgrade in 1717, peace being concluded with Austria at Passarowitz in 1718. Ahmed was deposed in 1730, and was kept in prison until his death.

**Ahmed Vefik** (1819–91). A Turkish statesman. Educated in Paris, he was ambassador in Persia 1851–55. In 1860 he went as ambassador to Paris, but was recalled in 1861. From 1879 to 82 he was vali of Brusa (Bursa), in Asia Minor, and his administra-

tion was eminently beneficial. He was twice prime minister of Turkey, and laboured to promote education. A French scholar, he translated Molière into Turkish.

**Ahobalam.** Village of Andhra, India, in Kurnool district. On a neighbouring hill are three pagodas of great local sanctity. One temple contains on its walls, and also on its two great stone porches, which are supported on rock-hewn pillars, beautiful reliefs of scenes from the Ramayana.

**Ahom.** Hinduised tribe of Tai origin living in the Brahmaputra valley, Assam. Their native chronicles record their crossing of the Patkai Pass in A.D. 1228 into the land named after them Assam. They overthrew the medieval Chutiya and Koch kingdoms. Their domination, culminating in 1700, declined until they were subjugated by the British in 1826. Their Tai speech is all but lost; matriarchy and other primitive customs survive.

**Ahriman.** Personification of the spirit of evil in the Zoroastrian belief of the ancient Persians and the modern Parsees. Like the Satan of the Bible, he is the chief of a hierarchy of demons of darkness, but, unlike, Satan, is regarded as the equal of the creator Ormuzd, or Ormazd, the spirit of good, although before the end of the world he is to be finally subdued. Other forms of the name are Angra Mainyu and Arimanes. See Zoroastrianism.

**Ahwaz,** AHWAS, OR AHWUZ. Town of Persia, in Arabistan province. It stands on the river Karun, 70 m. N.E. of Basra, and is notable for the neighbouring ruins of the capital of Artabanus, the last king of Parthia. In the war with Persia, 1857, it was captured by the British. During the First Great War the British occupied Ahwaz in order to protect the oil wells of the Anglo-Persian Oil company. It was again occupied by a British force in Aug., 1941, when armed intervention by British and Russian troops removed the danger of Nazi control in Persia. Ahwaz was subsequently used as an important clearing-station for British and American war supplies on the way to Russia. A new rly. to Ahwaz from Khorramshahr (near Basra) was constructed for the purpose. Pop. 53,000.

**Ai** OR HAI. Royal city of the Canaanites, E. of Bethel (Gen. 13; Josh. 7–8). The Israelites were smitten here after the fall of Jericho. With its inhabitants it was utterly destroyed by Joshua.

**Aicard,** JEAN FRANÇOIS VICTOR (1848–1921). French poet. Born at Toulon, Feb. 7, 1848, he achieved recognition with *Les Rébellions et les Apaisements* (1871). Other works include *Miette et Noré* (1880) and *Jésus* (1896). He also wrote plays and novels. He died May 13, 1921.

**Aichi.** Japanese aircraft-manufacturing concern which built dive-bombers used in the Second Great War.

**Aich's Metal.** A brass alloy of the same group as Muntz metal (*q.v.*), containing 60 per cent copper, 38.5 per cent zinc, and 1.5 per cent tin or iron.

**Aida.** An opera by Giuseppe Verdi. This work was written to the commission of the Egyptian government for the opening of the Cairo opera house and first performed there in Dec., 1871. The setting is ancient Egypt, and the libretto, by Ghislanzoni, was based on a theme suggested by Mariette Bey, the French Egyptologist. The music, rich and dramatic, belongs to the composer's middle period. In Feb., 1872, Verdi conducted the first Italian performance at La Scala, Milan. The opera was first performed at Covent Garden June 22, 1876.

**Aidan** (d. 651). Saint and Apostle of North Britain. He was a monk of Iona and was sent to Northumbria at King Oswald's request. There he won the people to Christianity, and was consecrated first bishop of Lindisfarne in 635. He made this place the centre of his missionary work, and when Oswald died his successor Oswy protected Aidan, who died at Bamborough, Aug. 31, 651.

**Aide-de-camp.** French term, applied in English to an officer who serves a general or a governor in a personal capacity. In Great Britain senior officers of the service are appointed honorary aides-de-camp to the sovereign. The title aide-de-camp is abbreviated to A.D.C.

**Aidin** OR AYDIN. Town of Turkey-in-Asia, chief town of Aidin vilayet. Served by rly., it lies 50 m. S.E. of Izmir, near the ruins of ancient Tralles. It makes leather and is noted for its sweetmeats, olive oil, fruit, and cotton goods. It suffered in an earthquake in 1899. The vilayet, in S.W. Turkey on the Aegean Sea, is bordered N. and S. by mountains that are the source of magnesite, lignite, arsenic, iron, copper, emery, and other minerals. Pop. (1950) vilayet, 337,977; town, 20,421.

**Aigun** OR SAKHALIN ULA. TOWN of Heilungkiang prov., Manchuria, China. On the right bank of the Amur river, it is 18 m. S. of Blagoveshchensk. It trades in grain, tobacco, and mustard. Here was concluded, May, 1857, a treaty whereby China ceded to Russia the left bank of the Amur. Pop. (est. 1952) 42,800.

**Aikawa.** Town on the W. coast of Sado Island, Japan. It is 40 m. W. of Niigata, on Honshu Island, and to the N.E. is the famous Sado gold mine, discovered in 1601. Silver is also worked, and the town has ore reduction works.

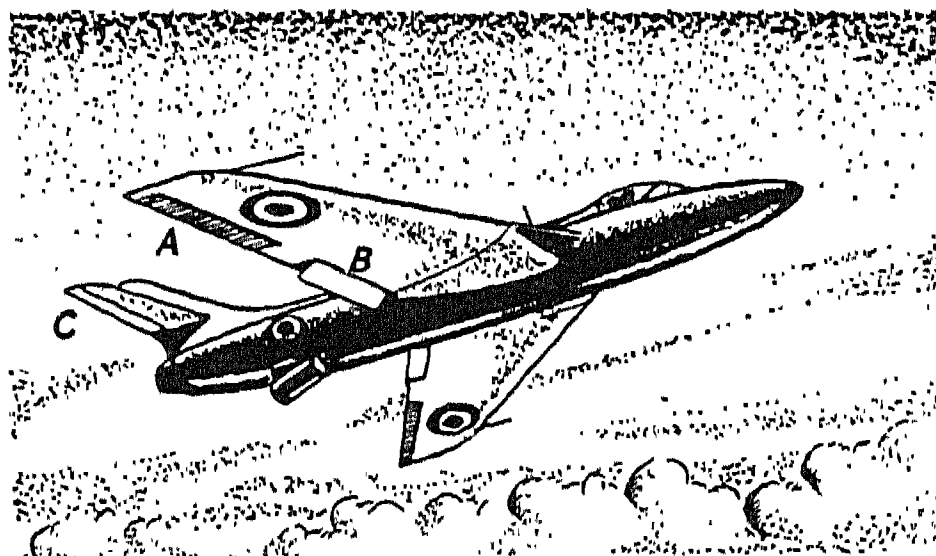
**Aiken, CONRAD POTTER** (b. 1889). American poet. Born at Savannah, Ga., Aug. 5, 1889, he graduated at Harvard in 1911. His first book of poetry, *Earth Triumphant and Other Tales*, appeared in 1914; and it was followed by many other volumes of verse and literary criticism, as well as a novel and short stories. During 1917-19 he contributed to *Dial*, and in 1930 he was awarded the Pulitzer prize for a volume of verse.

**Aiken, FRANK** (b. 1898). Irish politician, born Feb. 13, 1898. Active in the Irish Volunteers, 1914, he fought against the "Black-and-Tans," 1920-21, commanded the northern division of the I.R.A. in 1921, and was I.R.A. chief of staff 1923. He helped to reconcile Michael Collins and De Valera. Member of the Dáil for Leath from 1923, he was minister for defence, 1932-39; for coordination of defence, 1939-45, for finance, 1945-48; for external affairs, 1951-54.

**Aikenhead, MARY** (1787-1858). Irish religious, founder of a congregation of the Sisters of Charity. Born Jan. 19, 1787, eldest daughter of a Protestant doctor of Cork, she became a Roman Catholic in 1802. She was asked by Archbishop Murray to assist in founding a congregation of the Sisters of Charity in Ireland, and to this end remained for three years as a novice in a convent at York. She returned to Dublin, where the first members of the congregation took their vows in 1815, and she was appointed superior-general. Although almost bedridden for many years, she eventually superintended eight convents, an asylum for penitents, and a hospital in Dublin, the first hospital in Ireland to be served by nuns. She died July 22, 1858.

**Aikenhead, THOMAS** (c. 1678-1697). Scotsman hanged for blasphemy. Born in Edinburgh, the son of an apothecary, he was accused of expressing contempt for the Scriptures and for theology generally. He recanted, but was brought to trial under a statute which declared the blaspheming of any Person of the Trinity a capital offence, and was hanged at Edinburgh, Jan. 8, 1697 (N.S.), after declaring his full adherence to the Christian faith.

**Aikin, JOHN** (1747-1822). A British author. Born at Kibworth-Harcourt, Jan. 15, 1747, he



**Aileron.** Diagram of aeroplane showing right-hand aileron (A); the right wing flap (B); and the right-hand elevator (C)

qualified as a physician, and from 1792 practised in London. A friend of Robert Southey and Joseph Priestley, he produced in collaboration with his sister, Anna L. Barbauld, several popular books, including *Evenings at Home*, 1795. He also wrote a number of biographies. He died Dec. 7, 1822.

**Ailanthus** OR TREE OF HEAVEN (*A. glandulosa*). A large tree of the family Simarubaceae, native to North China, whence it was introduced to Europe in 1751. In some places it is extensively planted as a shade tree. Its compound leaves are from 2 ft. to 6 ft. long, and may be mistaken for leafy branches. The flowers are small, greenish-white, and evil-smelling.

The larva of the *Ailanthus* silk-moth feeds on the plant.

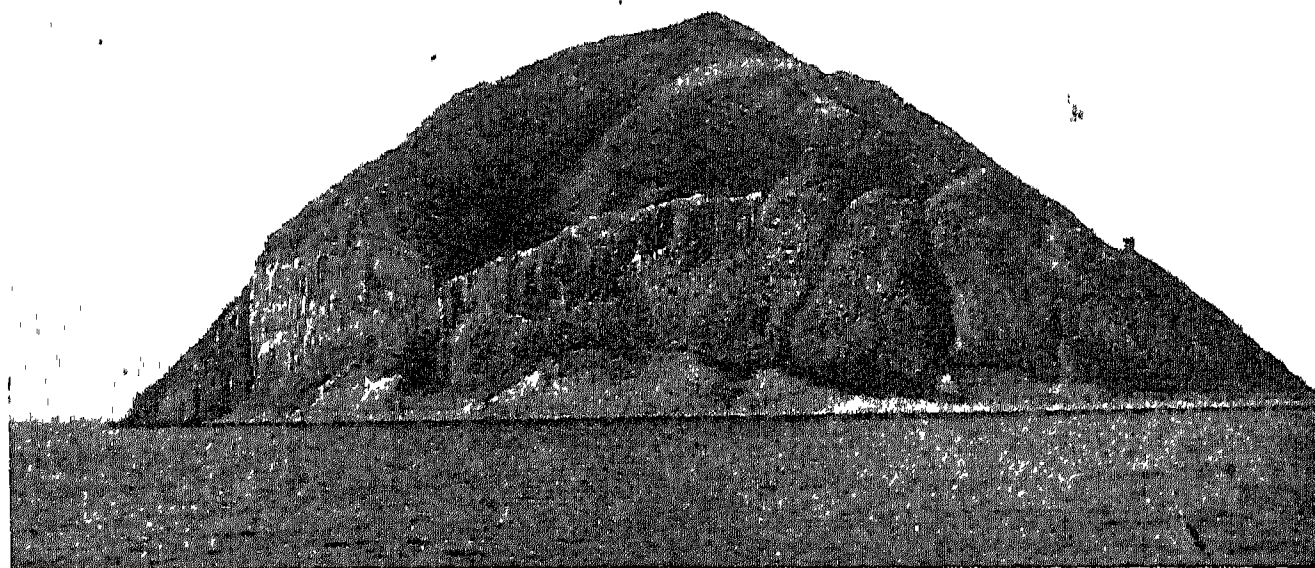
**Aileron** (Fr., wing tip). The hinged surface fixed to the trailing edge of aircraft wings to provide lateral control and to assist in banking during a turn. Fitted near the wing tips, the ailerons are interconnected, and are moved by means of the pilot's control column. When the column is moved to the left, the left aileron is raised and the right aileron is lowered. The result is that the "angle of attack" to the airflow over the wings is reduced on the left and increased on the right.

It follows that the left wing loses some of its lift and drops while the right wing rises as its lift is increased. The opposite effects are produced when the control column is moved to the right. On large aircraft the ailerons are power-operated. See *Aeronautics*.

**Ailesbury, MARQUESS OF.** British title given in 1821 to the family of Brudenell-Bruce. This family is descended from Thomas Brudenell

(a youngson of the 3rd earl of Cardigan) who was made earl of Ailesbury in 1776. He was a nephew of Charles Bruce, 4th earl of Elgin and 3rd earl of Ailesbury of an earlier creation, who in 1746 was created Baron Bruce with special remainder to Thomas Brudenell, who then assumed the surname Brudenell-Bruce. The 2nd earl of Ailesbury was created a marquess, and in 1868 the 2nd marquess inherited the title of earl of Cardigan, since used by an eldest son of the marquess.

**Ailly, PIERRE D'** (1350-1419). French theologian and philosopher. Born at Compiègne, he became chancellor of Paris University in 1389, bishop of Cambrai in 1396, and cardinal in 1411.



**Ailsa Craig.** Basaltic rocky islet in the Firth of Clyde, Scotland. Rising 1,140 ft. above the sea level, it is popularly called Paddy's Milestone. See p. 186





Ainu. Man and family in their reed-thatched hut. The tattooed marks round the women's mouths are considered to enhance their beauty

agglutinative language, clearly primitive, with no living analogies, is richly developed, a vocabulary of 14,000 words having been compiled. Their animism includes a complex nature-worship of the sun, fire, lightning, and rivers, and a system of magico-religious "message-bearers" loosely comparable with African fetishism. These are usually formed of wands hung with willow shavings, and set up at the east end of the living-room. Their ceremonial bear feasts are designed to offer divine honours to the victims, whose skulls are afterwards erected on village poles.

**Air.** The mixture of gases, roughly four-fifths nitrogen and one-fifth oxygen, which makes up the atmosphere surrounding the earth. It is necessary for all forms of life, except a small group of anaerobic organisms, and is also the chief medium of combustion. Aristotle regarded air as one of the four elements, and this idea long persisted. The credit for the first discovery of the composite nature of air goes to the English doctor John Mayard (1643-79), who burned candles and enclosed mice in a confined space, and showed that air contained "a vital, fiery, and in the highest degree fermentative spirit" which was necessary to, and exhausted by, both combustion and respiration.

For at least another century all gases continued to be called air; and much chemical thinking was confused by such terms as "fixed air" (carbon dioxide), "inflammable air" (hydrogen), "dephlogisticated air" (oxygen), which concealed the fact that these were as much different substances as the various acids or earths or metals. The confusion was closely con-

nected with the idea of Phlogiston (*q.v.*), and was not cleared up until the phlogistic theory yielded to the analytic genius of Lavoisier in the late 18th century. By careful weighing of the various substances involved in calcifying (oxidising) mercury and then recovering the metal from its calx (oxide), Lavoisier showed that "atmospheric air is composed of two elastic fluids of different, and so to speak opposite, natures." The discovery of a residuum of inert gases in its constitution was first made by Cavendish in 1785; they were rediscovered, separated, and named by Lord Rayleigh and Sir William Ramsay over a century later.

Dry air is a mixture (by weight) of approximately 75 p.c. nitrogen, 23 p.c. oxygen, 1.3 p.c. inert gases, with a variable quantity of carbon

dioxide and traces of other substances (*see Atmosphere*). It can be liquefied at  $-140^{\circ}\text{C}$ . by a pressure of 39 atm. Liquid air is pale blue, and boils under atmospheric pressure at  $-185^{\circ}\text{C}$ . Fractional distillation of liquid air is the chief commercial source of oxygen and the inert gases (except helium). Atmospheric air is also used commercially as a source of nitrogen which is "fixed," or made to combine with other elements, to produce fertilisers and explosives.

**Air.** In music this has several meanings, apart from the chief one of melody or tune. It means the highest or principal part in concerted music for voices or instruments; a simple song-like movement in a 17th- or 18th-century suite, consisting otherwise mainly of dances—in which sense it is sometimes spelt *ayre*; and a similar movement, somewhat broader and weightier, in suites by Bach and his contemporaries.

**Airborne Forces.** Military forces transported by aircraft to a centre of operations. The term includes parachute troops dropped over their objective and troops landed at their destination from gliders and powered aircraft. In the Second Great War airborne forces had five chief rôles: (1) securing ground as a pivot for manoeuvre; (2) overpowering defences by direct assault; (3) completing the destruction of a defeated and retreating enemy; (4) seizing airfields; (5) disrupting an enemy's rear communications.

Airborne troops played a decisive part in the German conquest of Crete, 1941; and were used by



Airborne Forces. British parachute troops bound for the Netherlands in a C-46 transport aircraft to take part in the Arnhem landings on Sept. 17, 1944  
Photo, British Official



are, as a general rule, constructed of steel plates forming a casing, in which an impeller or series of blades is mounted on a power-driven shaft. Ducting connecting the various units of the plant to the fan and from the fan to the spaces to be conditioned can be made in a variety of metals, but is usually rustless steel, or, occasionally, constructed of brick or concrete.

Air inlets to rooms or other spaces to be conditioned terminate with grilles, registers, or diffusers; in the ducting behind each inlet are controlling devices or a system of damping.

At the point where air is drawn into the plant, filters trap the coarser dusts and impurities in the incoming air. Filters may be of metal coated with oil. They may be of a size that can be conveniently washed and re-oiled; or they may be self-cleaning, with a continuous belt carrying them through an oil bath. Others are of fabric, *e.g.* blanket, glass fibre, aluminium wool, foil. The type of filter depends on the degree of cleanliness required and the method of cleaning. The smallest particles can be filtered out of the air by means of electrical precipitation, which requires a filter consisting of electrically charged wires and plates. The dust passes over the wires and becomes charged with electricity; on reaching the plates it is repelled on

to supply moisture, consist of water sprays, scrubber plates, and eliminators.

**Air Council.** The controlling authority of the Royal Air Force, established under the Air Force (Constitution) Act, 1917, to administer matters relating to the R.A.F. and the defence of the realm by air. It comprises: the secretary of state for Air (president); parliamentary secretary of state for Air (vice-president); chief of the air staff; air member for personnel; air member for supply and organization; vice-chief of the air staff; deputy-chief of the air staff; controller of aircraft (ministry of Supply); permanent under-secretary of state for Air. The Air ministry assists the air council to discharge its administrative responsibilities.

**Aircraft Carrier.** Warship designed for the transport and operation of naval aircraft. It is a completely self-contained air-base, with squadrons of aircraft, and the personnel and equipment to operate and maintain them. A carrier's functions are: (1) to operate its aircraft to provide reconnaissance for the fleet, to extend the vision of surface ships when searching for an enemy ship, and, after sighting, to shadow and keep touch with her; (2) to attack by its air striking force a faster enemy ship attempting to escape battle, or so to reduce her speed that she can be brought

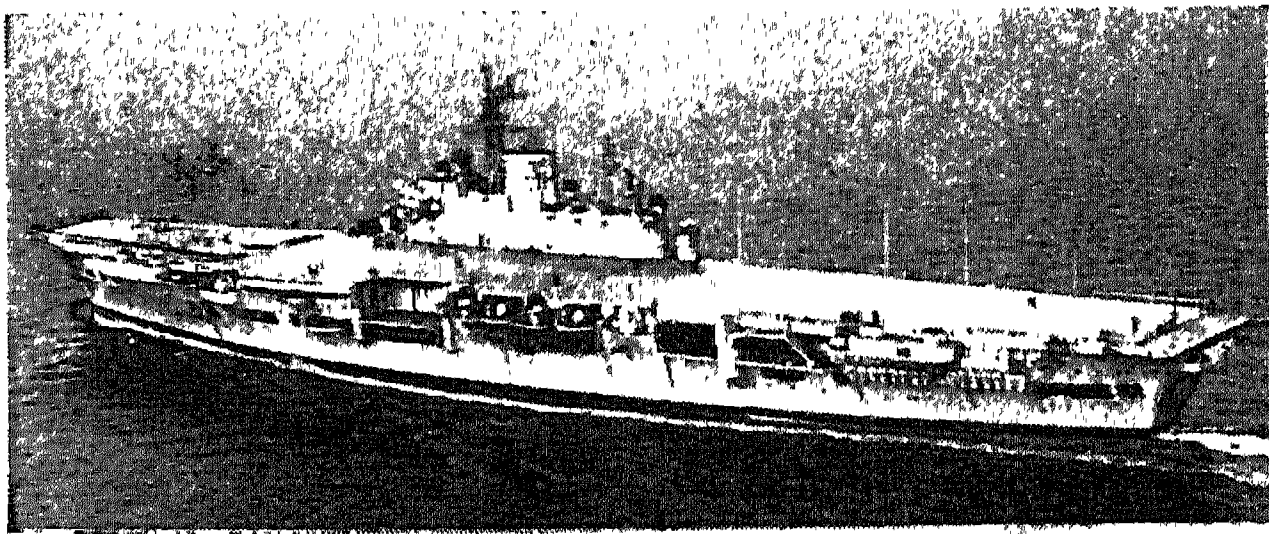
gunnery in surface actions or shore bombardments.

The first plane to alight on board the ship from which it was launched was a Sopwith Pup piloted by E. H. Dunning which landed on a specially-built deck forward of the bridge of H.M.S. Furious on Aug. 2, 1917.

H.M.S. Argus, a converted merchant ship, was the first aircraft carrier with flush deck, and the first to embark, Oct., 1918, a squadron of torpedo-carrying planes. She and the Furious, the only two carriers in commission during the First Great War, were followed by the Eagle, the Hermes (first carrier to be designed and built as such), the Courageous, the Glorious, and the Ark Royal. The Furious and the Courageous were converted from ships originally designed as 18-in. gun cruisers.

At the outbreak of the Second Great War there were 23 aircraft carriers in service in the world. The R.N. had eight, the U.S.A. seven, Japan seven, France one. The German Graf Zeppelin, launched in 1938 and designed to carry 40 aircraft, was never completed. Combat experience during that war led to the development of four main types: fleet carriers; light fleet carriers; merchant aircraft carriers; escort carriers.

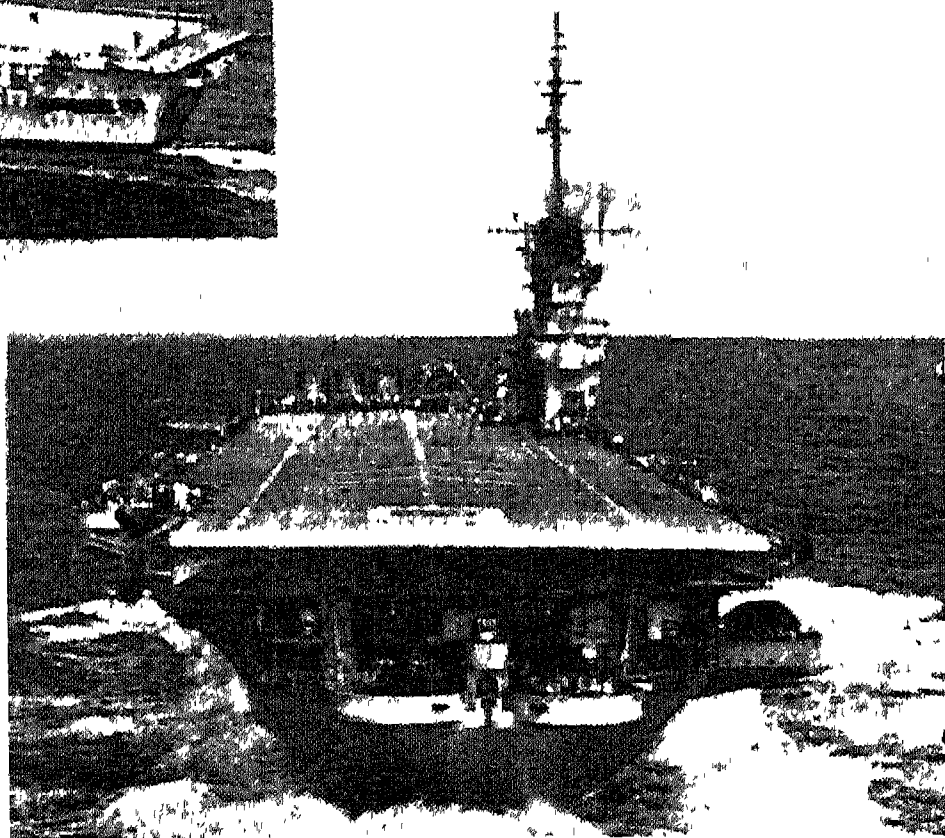
Most escort carriers were oil tankers and bulk grain vessels; besides carrying a normal cargo they operated fighter aircraft from a flight-deck, 450 ft. long and 60 ft. wide, to provide air cover against German submarines and long-range bombers attacking convoys. The first escort carrier was the



to oil-coated earthing plates which can be removed for cleaning.

Heaters consist of batteries of pipes, with plain tubes or with tubes fitted with gills or fins, through which hot water or steam is passed. Coolers are made up from pipe systems through which circulates chilled water, brine, or other refrigerant. Batteries made of steel, wrought iron, or copper, with distributing headers at top and bottom through which the heating or cooling fluid is circulated to the tubes, are fixed at two stages in the air circuit: between the filter and the air washer, and after the air washer. Air washers,

to action by surface ships; (3) to assist in protecting naval formations and merchant ship convoys against submarine and air attack; (4) to strike with its aircraft at enemy vessels and installations in harbours and anchorages not approachable by surface ships; (5) to spot for naval



**Aircraft Carrier.** Stern view of the flight deck of the United States carrier Essex. Displacing 31,000 tons, the Essex carried 100 aircraft. Above, H.M.S. Ark Royal, a 36,800-ton fleet aircraft carrier of the Royal Navy. Laid down in 1944 and completed in 1955, the Ark Royal cost £25,000,000 and accommodated 50 aircraft



can change position by anything up to 500 miles in 24 hours), the aircraft carrier is better protected than a land base.

**Aircraft Constructors, THE SOCIETY OF BRITISH.** Organization formed in 1916 by the principal aeroplane manufacturers of the U.K. to develop coordination in all matters of common interest. The offices are at 32, Savile Row, London, W.1. It is the official representative body of the British aircraft industry and, being recognized as such, has the cooperation of government departments. The society sponsors displays of military and civil aircraft at which prototypes and standard production machines are demonstrated before foreign diplomats, air attachés, trade representatives, and, on selected days, the public.

**Aircraft Establishment, ROYAL.** Organization (called the Royal Aircraft Factory before the Royal Air Force was formed and assumed the initials R.A.F.) comprising engineering workshops, an experimental and research dept., aircraft hangars, and an aerodrome. It was set up by the govt. in the early days of flying, at Farnborough, Hants. Much valuable work was carried out in the development of man-lifting kites, balloons, airships, aero-engines, aeroplanes, and radio. The establishment designed and built the prototypes of most of the outstanding British aircraft used in the First Great War. Between the two great wars it did theoretical and practical work in the development of four-engined bombers and monoplane fighters, while it revolutionised the design of instruments of navigation and for bombing. Important tasks of the Second Great War were the development of airborne radar and improvement in air frames and engines for high altitude flying. In 1942 the first British jet aircraft was flight-tested here. After the Second Great War the establishment handled a research programme for the development of guided missiles.

**Aircraftman.** Generic title for the lower five grades in the Royal Air Force, which, in ascending order, are aircraftman 2nd class, aircraftman 1st class, leading aircraftman, senior aircraftman, and junior technician. On the sleeves of his jacket, a leading aircraftman wears a two-bladed propeller badge, a senior aircraftman wears a three-bladed propeller badge, and a junior technician wears a single chevron.

**Aircraft Production, MINISTRY OF.** British government department of the Second Great War. Set up in 1940 to supervise the development and manufacture of aircraft and related accessories, it included a section responsible for the examination, dismantling, and reconstruction of enemy aircraft that had fallen into British hands. The ministry also controlled the Air Transport Auxiliary (*q.v.*). The first minister of Aircraft Production was Lord Beaverbrook, 1940-41. In 1945 the ministry was merged with the ministry of Supply.

**Aircraftwoman.** Generic title for the lower five grades in the Women's Royal Air Force, which, in ascending order, are aircraftwoman 2nd class, aircraftwoman 1st class, leading aircraftwoman, senior aircraftwoman, and junior technician. A leading aircraftwoman wears on the jacket sleeves a two-bladed propeller badge, a senior aircraftwoman a three-bladed propeller badge, and a junior technician a single chevron.

**Air Crew.** The flying personnel of the Royal Air Force, Royal Navy, and other air services. An air crew varies from pilot and observer-navigator to a unit composed of captain, second pilot, engineer, navigator, signaller, and bomb aimer (U.S. bombardier). During the Second Great War bombers also carried air-gunners.

**Air Crew Europe Star.** British campaign star of the Second Great War. Instituted May 18, 1945, it was granted for operational flying from U.K. bases to targets in Europe from Sept. 3, 1939, to June 5, 1944. The ribbon, designed by George VI, is light blue with black edges and a narrow yellow stripe at each side. The star is identical in shape and material with the seven other cam-

paign stars awarded during the Second Great War.

**Aird, SIR JOHN (1833-1911).** British civil engineering contractor, constructor of great dams on the Nile at Assuan and Assiut. Born in London, Dec. 3, 1833, Aird joined his father (d. 1870) as a contractor. The elder Aird had erected the Crystal Palace in Hyde Park, and after the 1851 Exhibition the firm was entrusted with its removal to Sydenham. It undertook the construction of railways, docks, etc., in many



Sir John Aird,  
1st Baronet

parts of the world; secured the contract for the Nile dams, constructed 1898-1902; and was connected with the building of Beckton, largest gas-works in the world; of Calcutta waterworks; and of docks at Avonmouth and Singapore. During 1887-1905 Aird, created a baronet in 1901, was Conservative M.P. for North Paddington. He died Jan. 6, 1911.

**Airdrie.** Burgh of Lanarkshire, Scotland, created 1821. It is on the rly., 12 m. E. of Glasgow. Heavy and light engineering, iron and brass founding, and brick making are long established industries; coal mining and the once thriving weaving trade are almost extinct. Manufactures introduced more recently include pharmaceutical products, pre-cast concrete, and biscuits. The public library, opened in 1854, was the first free library in Scotland. Pop. (1951) 30,313.

**Aire.** River of Yorkshire, England. It rises in the Pennines, though its exact source has been disputed. It is generally accepted

that the stream flows into Malham Tarn, leaves by a subterranean course, and reappears from beneath the semi-circular limestone cliff wall of Malham Cove, a beauty spot 1 m. N. of Malham village. It flows S. to Bell Busk, S.E. to Castleford, and then mainly E. to join the Ouse at Airwyn above Goole, a course of 88 miles. The

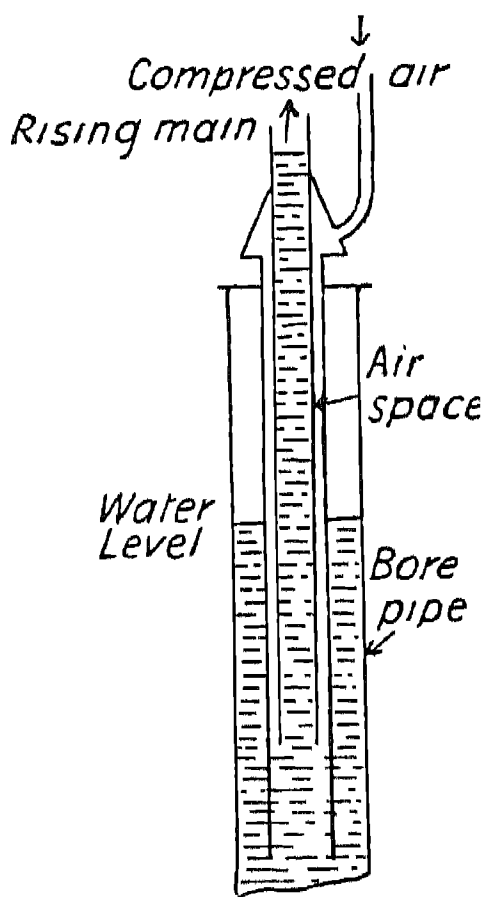


Aire. From the base of the limestone cliff at Malham Cove (above) the Yorkshire river first emerges in full flow after an underground course

earl's son was attained for assisting in the Jacobite rising of 1715, and another descendant for taking part in the rebellion of 1745. The attainders were removed in 1778. The earldom is Scottish, and does not entitle its holder to a seat in the house of lords, though the 11th earl (b. 1893) served as a representative peer for Scotland. An eldest son is called Lord Ogilvy.

**Air Lift.** Form of pump for raising liquids from deep wells.

Two tubes are placed concentrically inside the well bore, e.g. an outer tube 5 ins. in diameter and an inner one of 3-in. bore. The outer tube is open at the bottom and extends farther down into the liquid (water or oil) of the well; at the top it is sealed around the inner tube (which forms the rising main), except for a point at which a compressed-air supply pipe enters. When air under pressure is forced into the outer tube, it pushes down the water or oil, which rises up the inner tube. When all the liquid in the outer tube has been forced down



**Air Lift.** Pump for deep wells: compressed air forced between two concentric tubes causes water to rise in inner tube

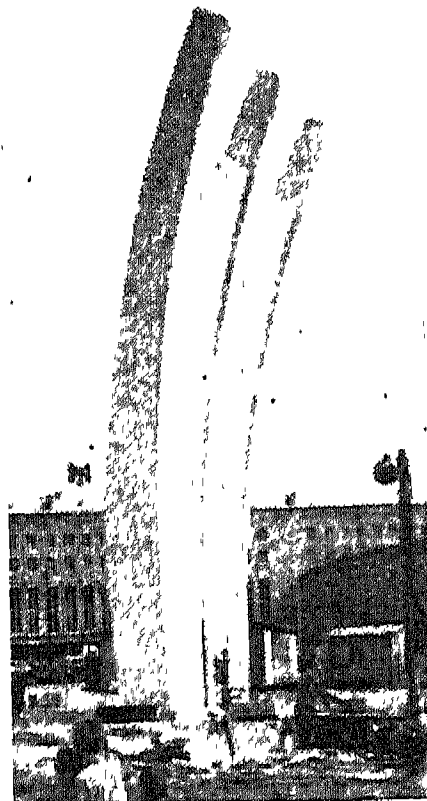
to the level at which the inner tube terminates, air escapes up the inner tube, carrying liquid with it. The compressed air mixed with this liquid lowers its density below that of the liquid in the space between the bore of the well and the wall of the outer tube. Thus the denser liquid outside, by its greater weight, forces the lighter air-and-liquid mixture up the central tube. The depth from which liquid can be raised by an air lift depends upon the depth to which the outer tube is immersed below the liquid level in the well or bore-hole.

The best result is obtained when the lift is three times the depth of the outer pipe in the liquid.

**Air Lift.** Term introduced in the Second Great War for the movement of a military force by aircraft. It was used for the system of civil and military air transport of necessities organized in 1948-49 by the U.S.A. and the U.K. during the Soviet land and water blockade of western Berlin (which was completely surrounded by Russian-occupied Germany). The Berlin air lift lasted 462 days, from June

outside air. Workers are able to enter or leave, and materials can be similarly moved, without loss of pressure in the workings. An air lock also serves as a compression or decompression chamber in which the pressure can be gradually varied (a) to raise it to that in the workings; or (b) to lower it to that of the outside air. In its simplest form the air lock has two doors—one opening inwards from the outside air,

the other opening outwards into the working chamber. To gain entrance from outside, a worker signals for the farther door to be shut; he then, by means of a valve, reduces the air pressure inside the lock until it is the same as that outside, when he enters by the outer door and closes it. He then admits air from the working chamber through another valve until the pressure in the lock is

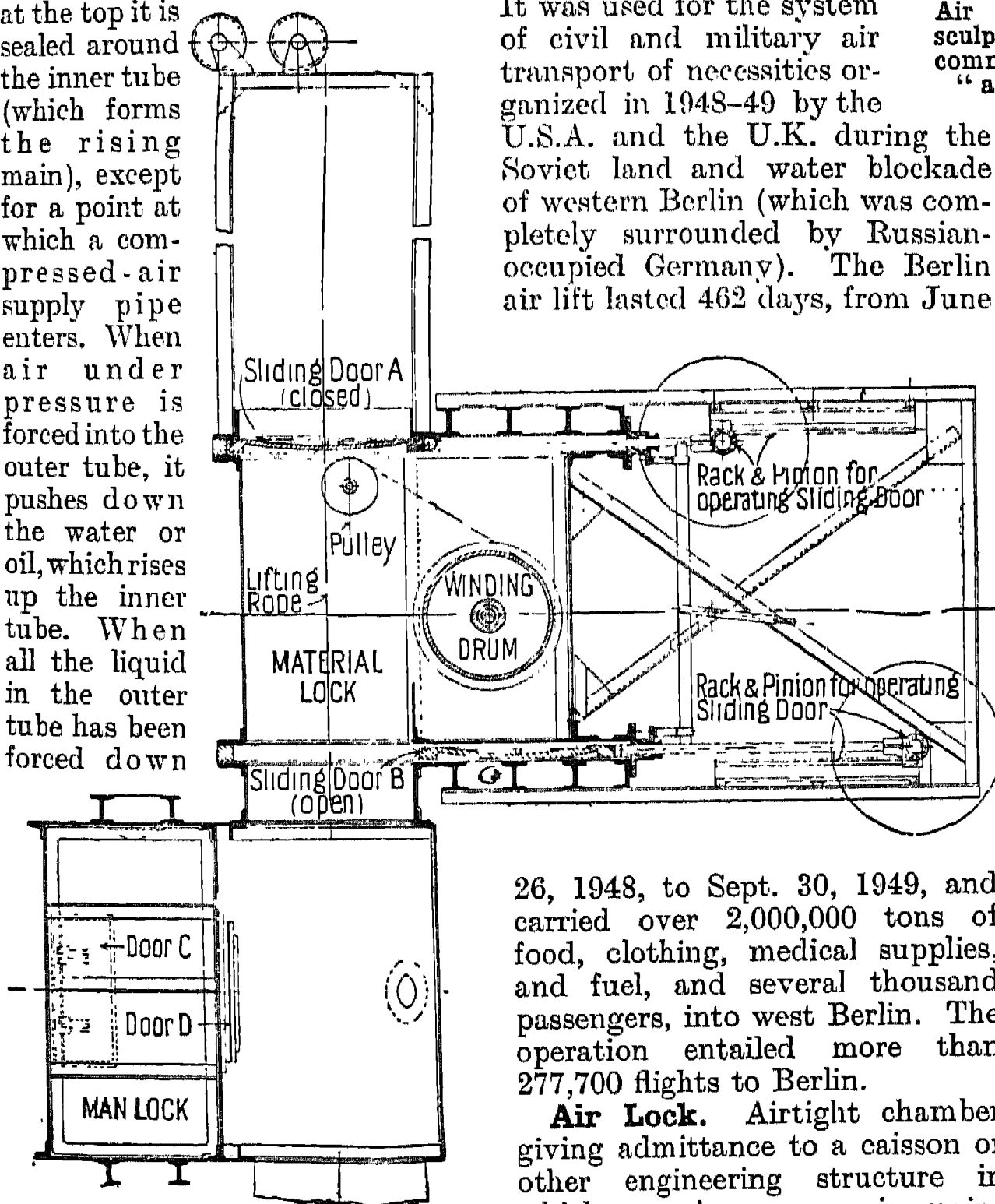


**Air Lift.** Symbolical sculpture in west Berlin commemorating the "air lift," 1948-49

equalised with that in the inner chamber, when the inner door can be opened and he can pass from the lock into the working chamber. Air locks for admitting materials work on a similar plan.

To prevent Caisson Disease (*q.v.*), men entering workings in which high air pressure is maintained must remain in the lock while the air pressure is gradually equalised with that inside; when leaving they must similarly wait for the air pressure to be gradually equalised with that outside.

**Air Mail.** The carriage of postal matter by air. Apart from messages sent by carrier pigeon, the first air mail was the letters sent by balloon from Paris during the siege of 1871. Letters were carried on some of the experimental Zeppelin flights during 1901-12. On Sept. 9, 1911, the first regular air mail service in the world was established between Hendon and Windsor, a distance of 22 miles. Although officially supported by the G.P.O., the experimental service lasted for only one week. Immediately after the First Great War the R.A.F. and the British Army Post Office began an experimental air mail service between Folkestone and

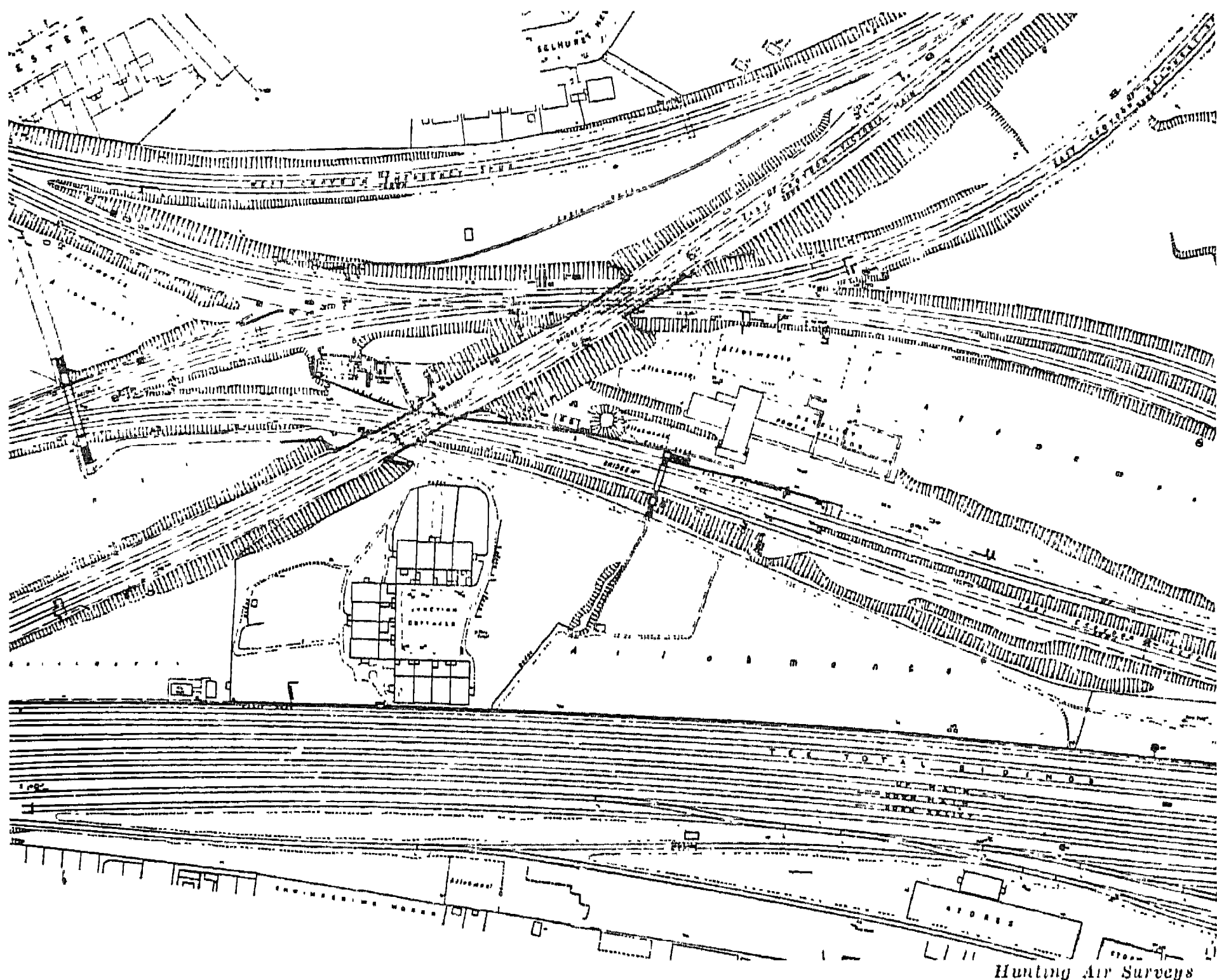


**Air Lock of Sir W. Arroll.** Its method of working is explained in the text.

26, 1948, to Sept. 30, 1949, and carried over 2,000,000 tons of food, clothing, medical supplies, and fuel, and several thousand passengers, into west Berlin. The operation entailed more than 277,700 flights to Berlin.

**Air Lock.** Airtight chamber giving admittance to a caisson or other engineering structure in which an air pressure is maintained greater than that of the





Air Photography. Plan of Norwood railway junction prepared from the air photograph on the opposite page. The network of railway lines has been brought out clearly and extraneous matter has been eliminated

Hunting Air Surveys

stereoscope. This necessitated automatic operation of the camera, first achieved by means of apparatus driven by a small wind rotor outside the aircraft: later by the use of electrical or mechanical drives. The aerial camera has been developed into an instrument of great precision, the lenses being such that defects and aberrations are virtually eliminated, and they can be classed as distortion-free: most important in map making, as such lenses ensure that points of detail are photographed in their correct orientation.

The great advantage of air photography is its flexibility. Small scale initial reconnaissance can be made of territories relatively unexplored on the ground. In this way assessments can be made of natural resources and geographical and geological features to determine how best to exploit an area by irrigation, forestry, hydro-electric development, town-planning, etc.

As a general rule, a survey from the air costs less than one made on the ground, and in some of the remote areas of the world it is the only practical means of obtaining the information necessary to pro-

duce a map. Large scale air surveys for civil engineering and town-planning are normally made from comparatively slow flying aircraft at altitudes not exceeding 5,000 ft. The cameras use film, with the emulsion coated on a special minimum distortion base. Glass plates are used for more exacting work on a very large scale. The small scale photography normally used in initial reconnaissance and resources surveys is done by high-flying aircraft.

The ground to be photographed must be fully covered by a continuous series of photographs with sufficient ground photographed from two points of view on adjacent exposures to permit stereoscopic examination. The stereoscope produces a third dimension image, with all the effect of a relief model, and this forms the basis of map production and interpretation.

The simplest application of air surveying is in map revision, as for example of the 1/2,500 British Ordnance Survey map. In areas where towns have been extended to include less built-up sections, simple revision can be made by tracing detail from recent photo-

graphic air cover on to existing maps. Where there is considerable height variation, such graphical methods are unsatisfactory and mapping has to be done with special three-dimensional instruments.

Another relatively simple application is the production of mosaics, which involves an assembly of all the resultant prints from an air survey. A mosaic made by joining the photographs together without consideration of the exact geographical position of points of detail is called an uncontrolled mosaic. By relating the photographs to known points on the ground called controls, obtained from a ground survey, from existing maps, or from a graphical method of control called slotted template, a more precise photo plan can be constructed. Such mosaics form an admirable preliminary to the more detailed mapping of undeveloped countries, as it makes it easier to fix check points and base lines for ground survey triangulation.

Nearly all surveys from the air involve the use of machine-mapping. No map can be produced

**Air Pilot.** Person qualified by test to fly an aeroplane. In the U.K. there are five types of civil air pilot licence: student, private, and (for professionals) commercial, senior commercial, and air-line transport. Licences are issued by the ministry of Transport and Civil Aviation, which will accept a Royal Aero Club certificate as proof of proficiency. Air pilots in the armed services are in a separate classification.

**Air Pollution.** Contamination of the atmosphere by the suspension in it of solid matter. It is most commonly caused by the combustion of raw coal, although certain industrial operations and fumes from road vehicles are contributory factors. Smoke is formed when the volatile hydrocarbons in coal escape unburned because of faulty combustion conditions. Ash and grit are also discharged, especially from industrial plant using fine coal and artificial draught. Sulphur dioxide gas, from the combustion of sulphur always present in coal and oil, is also emitted and, becoming acid with moisture, constitutes the corrosive factor in air pollution. Quantities discharged into the air each year in the U.K. were estimated by the Beaver committee on air pollution, 1954, as follows: 2,000,000 tons of smoke (nearly one half from domestic fires, which burn less than a quarter of the total coal consumed); 800,000 tons of grit; 5,200,000 tons of sulphur dioxide.

Air pollution affects health in three ways: air laden with impurities is used in respiration; natural light is obstructed by the overhanging smoke pall; and the gloomy and drab environment caused produces bad psychological effects. The incidence of bronchitis is much higher in urban than in rural areas; and there appears to be a definite correlation between air pollution and the incidence of lung diseases. The dangers of the normal smokiness of the atmosphere are increased when persistent natural fog prevents diffusion of the polluting material.

A persistent fog over London in Dec., 1952, caused

more than 4,000 deaths and led to the setting up of the Beaver committee, which estimated that the cost of air pollution in the U.K. was not less than £250 million a year, plus the value of perhaps 10 million tons of coal wasted as, and with, smoke. In addition to cleaning costs, etc., there is much damage to stonework, metal, and fabrics, and both losses and increased costs to agriculture. That smoke pollution of the air over an industrial town can be abolished has been demonstrated by St. Louis, Missouri, U.S.A., where regulations compel all citizens to use smokeless fuel or to instal a device that removes smoke from bituminous coal.

Of British legislation to abate air pollution, the main enactment was contained in the Public Health Act, 1875. A smoke abatement act of 1926, which became part of the Public Health Act, 1936, had little effect. After the Second Great War, new forms of control were included in a number of local acts that set up smokeless zones within which the emission of smoke is prohibited. The first zones, in Coventry and Manchester, certainly enjoyed cleaner atmosphere than before. The City of London became a smokeless zone in 1955.

Emission of industrial smoke can be prevented by the use of suitable plant efficiently operated; that from domestic fires can be prevented only by the use of smokeless fuels such as coke, or gas and electricity instead of raw coal. Emission of grit and dust from industrial plant can be greatly reduced by various types of washing or grit-arresting devices. The removal of sulphur dioxide is more difficult,

particularly as large and concentrated quantities are released from electricity generating stations.

The responsibility of dealing with air pollution is mainly in the hands of the local authorities, except for special processes controlled by the central alkali etc. works inspectorate. The systematic measurement of air pollution is carried out by local authorities, assisted and coordinated by the fuel research station of the department for scientific and industrial research. *Consult* Smoke: the Problem of Coal and the Atmosphere, J. Marsh, 1947; Air Pollution, O. Meetham, 1952; Report of the Committee on Air Pollution, H.M.S.O., 1954.

**Airport.** Place where commercial aircraft land or take off for the embarkation or disembarkation of passengers or cargo. Provision is also made for passport and customs examination, and for the servicing and maintenance of aircraft.

In the early days of commercial flying, when all-up weight of aeroplanes seldom exceeded 6,000 lb. and landing speeds were in the 50-60 m.p.h. range, any level grass field served as an airport. Such landing grounds were usual until the late 1930s; an outstanding example was Croydon, long the chief airport in the U.K., which continued to handle on its grass surface the bulk of traffic to and from the continent of Europe until London Airport (*q.v.*) was opened in 1946.

With the development of large and heavy multi-engined aircraft having high landing speeds, longer and stronger runways became necessary. The hard-surfaced runway then introduced was at first merely a rough stabilisation of the top soil;

later, runways of thick concrete were constructed up to 10,000 ft. long and able to support the landing impact of aircraft having all-up weights of 250,000 lb. The smaller airport, such as that shown diagrammatically in fig. 2 (*see* p. 198) has a single runway sited in the direction of the prevailing wind, but airports dealing with heavy traffic have several runways laid out according to set patterns. One such



Airport. Jan Smuts Airport, 18 m. N.W. of Johannesburg, South Africa, which had the longest runway in the world when it came into full operation in 1954. It replaced Palmietfontein airport, which was closed

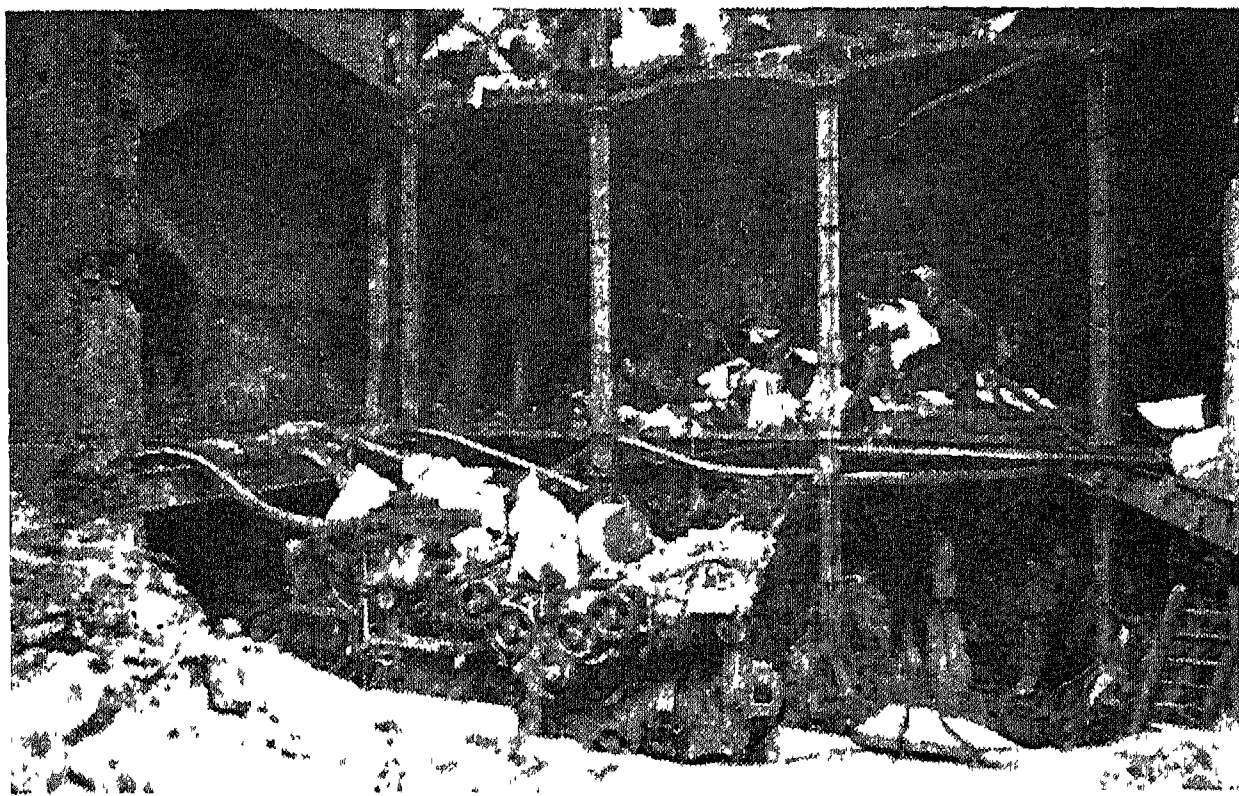


either over England or on their homeward journey, attacks by Zeppelin ceased.

The first aeroplane raid on London was made by a single machine on Nov. 28, 1916. The worst, from the point of view of casualties, was the daylight raid of June 13, 1917, when 22 raiders dropped nearly 100 bombs in the Liverpool Street area, killing 162 and injuring 432. From Sept. 3, 1917, Gotha attacks by moonlight became common. The last raid on London, and the last serious air raid of the First Great War, was on May 19-20, 1918; 30 to 40 machines took part, and casualties were 49 killed, 177 injured.

Total British air-raid casualties in the First Great War were 1,413 killed, 3,407 injured (London area: 587 killed, 1,627 injured).

The first British air raids on German soil were made in 1914



**Air Raid.** On Jan. 28-29, 1918, during the First Great War, one 1-cwt. bomb fell through the pavement light of a printing works in Long Acre, London: it exploded in the basement (used as a shelter), undercut the main walls, and wrecked the building; 38 were killed, 85 injured

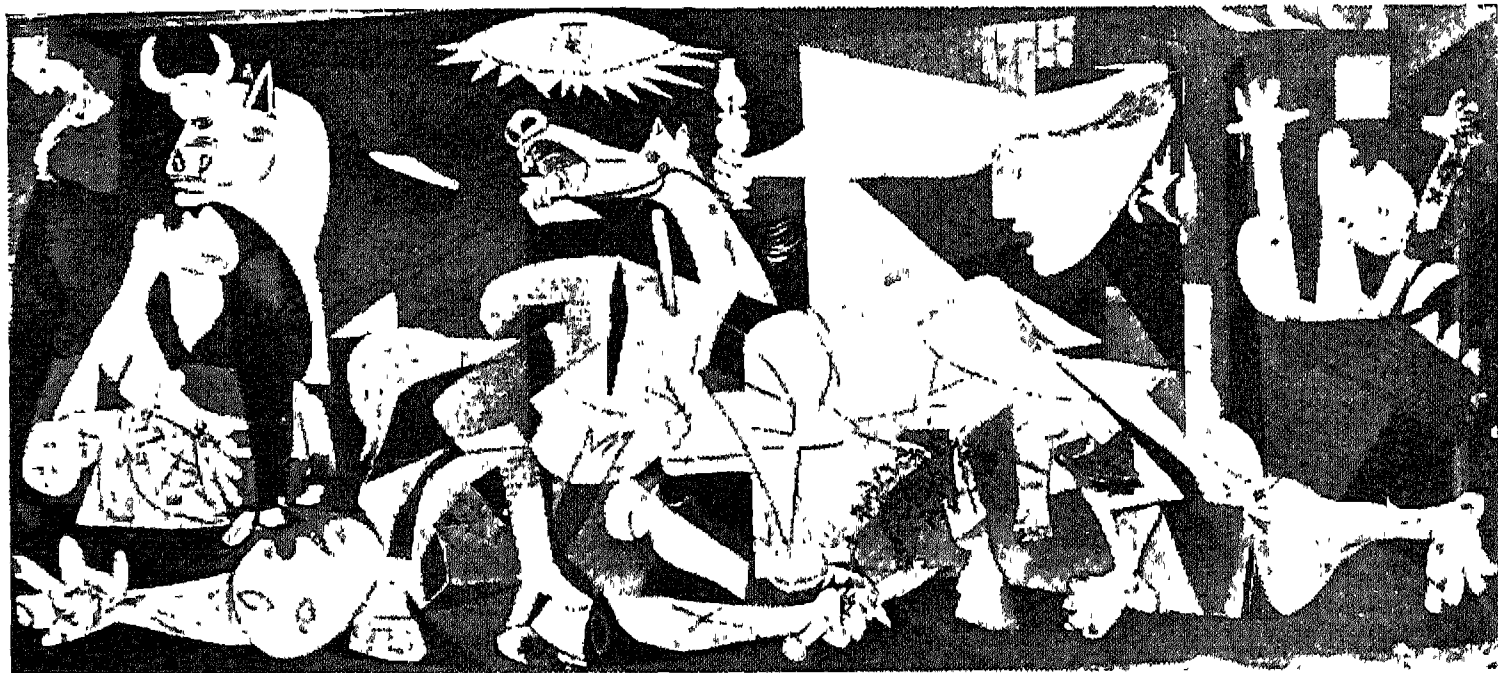
hearsal in the bombing from the air of defenceless Guernica (*q.v.*), Spain, in 1937. The Second Great

Warsaw, Sept. 1, 1939; and the German advance to the west began with the ruthless bombing of undefended Rotterdam, May 14, 1940.

**SECOND WAR RAIDS ON THE U.K.**—In the evening of March 16, 1940, 14 German bombers (Junkers 88) attacked the fleet anchorage at Scapa Flow; and the first British civilian to die by enemy air action in the Second Great War was killed that evening at Bridge of Waith, Isle of Orkney.

The first German bombs to fall on the mainland exploded near Canterbury on May 9, 1940. German air attacks against industry began with a raid on Middlesbrough on May 25, 1940, and increased thereafter in weight, until on July 10 the real attack began (*see* Britain, Battle of).

The first great daylight raid against a British city was that on the London docks on the afternoon of Sept. 7, 1940; the fires started were a beacon to night bombers that came over in waves from 8.10 p.m. to 4.30 a.m. From that day until Nov. 2 there was an



**Air Raid.** Picasso's symbolic Guernica, painted immediately after that Spanish city was bombed from the air in 1937; it forcefully expresses the horror of the deed. An interesting comparison can be made with the paintings by air raid firefighters, 1940-41, following p. 200

on airship sheds at Düsseldorf, Cologne, and Friedrichshafen by R.N.A.S. planes each carrying four 20-lb. bombs. The R.F.C. dropped the then notable quantity of a ton of bombs on Mannheim on Christmas Eve, 1917. In a raid in 1918 the main railway station at Karlsruhe was hit; at Cologne, 33 bombs were dropped in one daylight raid in May.

Between the Great Wars, punitive air raids were made from time to time by British aircraft on recalcitrant tribesmen in the N.W. Frontier Province of India; and the German Luftwaffe had a re-

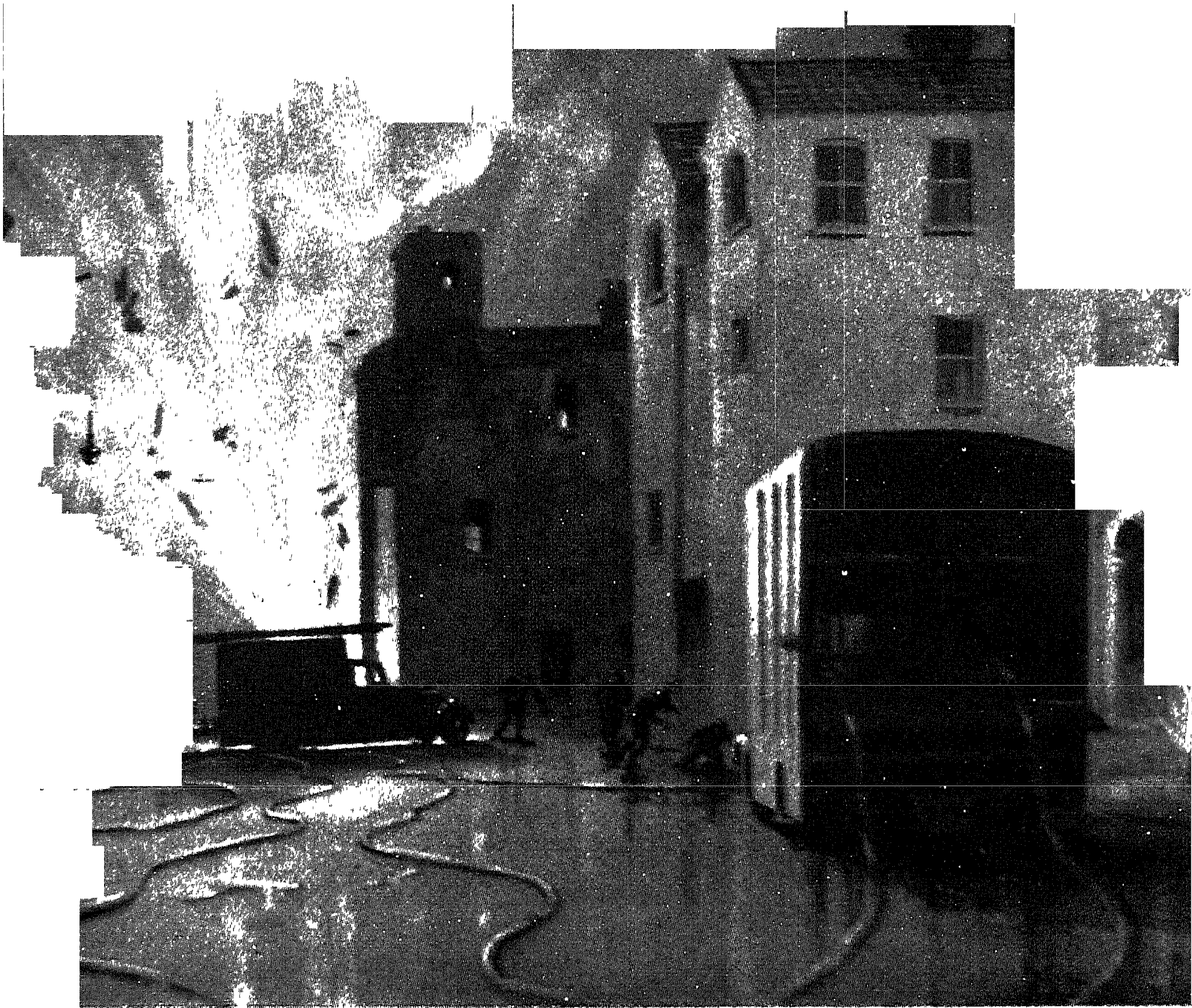
War brought massive raids by the chief combatants on both sides. Hostilities opened with the unopposed German air attack on

May 9, 1940. German air attacks against industry began with a raid on Middlesbrough on May 25, 1940, and increased thereafter



**Air Raid.** The gutted church of S. Lawrence stands up, a gaunt wreck, in the obliterated business quarter of Rotterdam after the German air attack, without any declaration of war, on May 10, 1940





**AIR RAID: ACTION PICTURES PAINTED BY MEN OF THE NATIONAL FIRE SERVICE**

Above: Hose Laying, by E. G. Turner, reproduced by courtesy of the Countess of Shaftesbury

Below: A.A. Guns in Action, by J. Wallace Orr





attack every night upon the capital. The heaviest raids in 1940 were on the nights of Oct. 15-16, Nov. 15-16, Dec. 8-9, and Dec. 29-30 when fire raged all round St. Paul's. Italian aircraft raided shipping off the Thames estuary on Nov. 11 and 23, 1940, but lost too heavily to repeat the adventure. Further heavy raids on London included one on May 10, 1941, in which the greatest weight of bombs on London in one night was dropped—450 tons.

Perhaps the most memorable of German raids on the U.K. was that on Coventry on Nov. 14-15, 1940, when in full moonlight 449 bombers flew in in relays over a period of about 11 hours: 503 tons of bombs, 881 containers of incendiaries, and 64 fire bombs were dropped on the city. Bragging of it afterwards, Goebbels coined the word *coventrieren*, to "coventrate."

Every sizeable port and industrial town in Great Britain was badly damaged in night raids, and many purely residential towns, *e.g.* Bexhill and Bournemouth, suffered attack, as did some villages and even farmsteads. But the attack on Great Britain failed, for the German army was unable to follow the Luftwaffe there.

When on June 22, 1941, the Germans invaded Russia, they drew off most of their bombers to the new front, and air attack against the U.K. was never again so heavy; the strength of the Luftwaffe was declining in relation to its commitments while that of the R.A.F. was rising. In 1942, in a series of raids launched in reprisal for R.A.F. destruction of historical buildings in Germany, the Luftwaffe attacked Exeter, Bath, Norwich, York, and Canterbury. Only 20 to 50 bombers were used in each attack—but serious damage was caused in these small cities, relatively unprotected against attack from the air: in Exeter, for instance, the bombers almost totally destroyed the picturesque High Street.

#### A.A. Gunners' Successes

During 1943 most of the Luftwaffe's raids were made by fighter-bombers, carrying one or two 500-lb. bombs or one 1,000-lb. bomb—"tip-and-run" raids—against the English coastal towns nearest to Continental airfields. But when more than 60 aircraft engaged in such raids were destroyed in three months, the Luftwaffe reduced this unprofitable activity. Some 1,000 A.A. guns were deployed along the south coast, and

A.A. gunfire and aircraft interception together brought down 306 enemy raiders over Great Britain during 1943. After some heavy night attacks in Feb. and March, 1944, raids by piloted aircraft almost ceased, and "robot" air attacks began (*see* Flying Bomb; Rocket Propulsion).

Air raid casualties in all Great Britain during the Second Great War were 60,585 persons killed, 86,175 injured and detained in hospital.

**ALLIED RAIDS ON AXIS OBJECTIVES.**—R.A.F. Bomber Command made its first attack on Germany on Sept. 4, 1939, when 10 Blenheim and 19 Wellington bombers flew to the Schillig Roads and Brunsbüttel respectively, to attack German warships. The Blenheims carried only two 500-lb. bombs each. Five Blenheims were lost. The pocket battleship Admiral von Scheer was slightly damaged. The Wellingtons did no observed damage at Brunsbüttel, and two aircraft were lost.

#### R.A.F. Leaflet Raids

Most of the R.A.F. sorties until April, 1940, were "leaflet raids." During the winter of 1939-40, R.A.F. bombers, using Villeneuve aerodrome in France as a staging post, flew high far over Germany, Czechoslovakia, and Poland, dropping leaflets urging revolt against the Nazis. These excursions were good navigational exercises, and were useful as reconnaissance. Little opposition was met.

Germany attacked again on land in April, 1940, overrunning Denmark and establishing a firm hold on Norway, and in May overran Belgium, the Netherlands, Luxembourg, and northern France. Allied bombing attacks started on land targets in Norway, the Netherlands, Belgium, and Luxembourg; and on the night of June 17-18, 1940, the R.A.F. attacked military objectives in Gelsenkirchen, Hamburg, Wanne-Eickel, Essen, Hamburg, Aachen, Duisburg, Rheydt, and Coblenz.

Bomber Command was not then a large force: its greatest effort had been to muster 92 bombers to attack the German fleet during the invasion of Norway; the aircraft were all two-engined—Whitley, Wellington, and Hampden strategic night bombers and Blenheim day bombers; and at the beginning of this phase night bombers were sent out singly to pin-point and attack individual targets; 250-lb. bombs were usual.

As soon as Italy declared war on June 10, 1940, Whitley bombers from the U.K. made a double crossing of the Alps on the night of June 11-12 to attack the Fiat works at Turin and the Ansaldo works at Genoa. On June 11 already R.A.F. planes from Egypt were out over Libya, Tobruk being raided for the first time on June 12, 1940. A force of Wellington bombers sent to Salon aerodrome near Marseilles bombed Genoa and Milan on the nights of June 15-16 and 16-17, 1940. Further attacks were made from the U.K. on Aug. 13 and Oct. 20, on industrial targets in Turin, Milan, Aosta, and elsewhere. Three attacks were made in Nov. and three in Dec., the most important target being on the petroleum refinery and stores of Porto Marghera.

Berlin was raided for the first time on Aug. 25, 1940, when the R.A.F. dropped 22 tons of bombs.

By the end of 1941 the power of Bomber Command had risen to a striking force of about 300 strategic bombers, with a proportion of 4-engined heavy bombers. Attacks were less dispersed. On Dec. 17-18, 1941, a force of 101 night bombers attacked Brest, where lay the German battleships Scharnhorst and Gneisenau and the heavy cruiser Prinz Eugen. In the war against U-boats and other German warships of every kind, Bomber Command's attacks on Continental ports between Aug., 1941, and Feb., 1942, included 34 on Brest, 18 each on Le Havre and Boulogne, 15 on Dunkirk, 13 on Ostend, 12 on Cherbourg, 5 on Rotterdam, 4 on St. Nazaire, 2 each on Lorient, Calais, and Antwerp, and one on Bordeaux. Bombers were escorted by fighters in many heavy day attacks on the German warships at Brest and the submarine bases at St. Nazaire and Lorient.

Even heavier attacks were made in the same period on the German ports where warships, U-boats, and aircraft were built and serviced, *e.g.* Emden, Hamburg, Kiel, Bremen, and Wilhelmshaven. Attacks on such naval targets continued to the end of the war in Europe.

The bombs used in their raids by the R.A.F. were of steadily increasing weight (*see* Bomb). They dropped their first 4,000-lb. bomb on Kiel, March 31, 1941; their first 8,000-lb. bomb on Karlsruhe, Sept. 2, 1942; their first 12,000-lb. bomb on the Gnôme-Rhône aero-engine works,



**Air Raid.** R.A.F. reconnaissance photograph taken a few hours after the bombing of the Möhne Dam, in the Ruhr, May 17, 1943. It shows clearly the 300-ft. breach through which the water surged, sweeping all before it

p.c. devastated by a single 1,000-ton attack, May 29, 1943. Krupp's works at Essen were bombed in March and April, 1945; by the end of the year it was estimated that their capacity was reduced by 40 p.c. In March and April, 1944, two 2,000-ton attacks were made on the partly repaired works, causing more damage than all the 1943 attacks: out of 200 large buildings only 6 escaped. On March 11, 1945, 4,500 tons were dropped on Essen, which received in all 15 major attacks. When Allied forces entered the town on April 9, 1945, they found the Krupp works had been reduced to empty shells of buildings and scattered heaps of rubble.

#### **Raids by U.S. 8th A.A.F.**

The first target of the U.S. 8th A.A.F. in Germany was Wilhelmshaven, Jan. 27, 1943. On April 17, 107 Fortresses bombed the Focke-Wulf fighter assembly plant at Bremen. The Germans, instead of rebuilding, moved the plant with its workers to Marienburg, on the Polish-Pomeranian frontier. On Oct. 9, 1943, U.S. bombers damaged 70 p.c. of the new factory; the Germans began to rebuild. On April 9, 1944, U.S. bombers destroyed nearly 70 p.c. of the

rebuilt factory. In these three attacks, typical of numerous others, the 8th A.A.F. lost 76 bombers and 8 escorting fighters, but against this loss they shot down 217 German fighters.

Germany attempted to guard her vital supply services by concentrating almost all her aircraft production on fighters, as Great Britain had been obliged to do in 1940. Large scale air battles developed, and many bitter combats were fought over Germany and Austria between July, 1943, and March, 1944, in the course of which the 8th A.A.F. destroyed 15,439 aircraft—11,232 in the air, 4,207 on the ground—and drove German industry underground: factories buried in the Harz and Thuringian mountains were constructed where jet-fighters and V-weapons were made 800 ft. below the ground.

In preparation for the intended Allied invasion of Normandy, which started on June 6, 1944, petroleum refineries at Leuna, Magdeburg, Politz, and in the Ruhr, and the German railway system were systematically hammered by R.A.F. and U.S. aeroplanes. The last bombing raid on Europe by the 8th A.A.F. was

against the Skoda works, Pilsen, Czecho-Slovakia, April 25, 1945. By then the 8th A.A.F. had dropped a total of 701,300 (short) tons of bombs.

#### **Air Assault on Berlin**

From Nov. 18, 1943, until the end of the war in Europe, Berlin was the object of some 30 heavy attacks and 170 lesser ones by R.A.F. aircraft, which dropped 40,845 tons on the city. The 8th A.A.F. joined in attacking Berlin in 1944, with four raids in March, one in April, and four in May. On June 21 over 1,000 Fortresses and Liberators dropped 1,300 tons on the city in a few minutes. On March 18, 1945, 1,000 Fortresses and 300 Liberators, escorted by fighters, dropped 2,500 tons on Berlin in daylight; and during the final Russian surface assault on Berlin the Red Air Force was reported to have used against the city 4,000 aircraft by day and 1,000 by night.

The following cities also received major attacks of from 500 to 5,000 tons: Cologne, 18 attacks; Duisburg and Stuttgart, 12 each; Dortmund and Hamburg, 11 each; Ludwigshafen, 10; Kiel, Düsseldorf, Homburg, Nuremberg, 8 each; Munich, Wanne,



with the power of atomic fission had been dropped by the Allies, introducing a new element of horror and destruction into the world. A second atomic bomb, even more powerful than the first, was dropped on Nagasaki on Aug. 9: it was 48 hours before the pall of dust and smoke permitted effective aerial reconnaissance. Raids on Japan in which H.E. and incendiary bombs were dropped continued up to the day of the Japanese surrender, Aug. 14, 1945.

Air raids with H.E. bombs formed part of the regular military operations during the Korea War, 1950-53; and were made in Malaya and French Indo-China against Communist rebels, in Kenya against Mau Mau terrorists.

**Air Raid Precautions (A.R.P.).** Name of a dept. of the British Home office formed April 1, 1935, to take over from the committee of imperial defence responsibility for civil defence in the U.K. A general scheme for the defence of civil population and property in the event

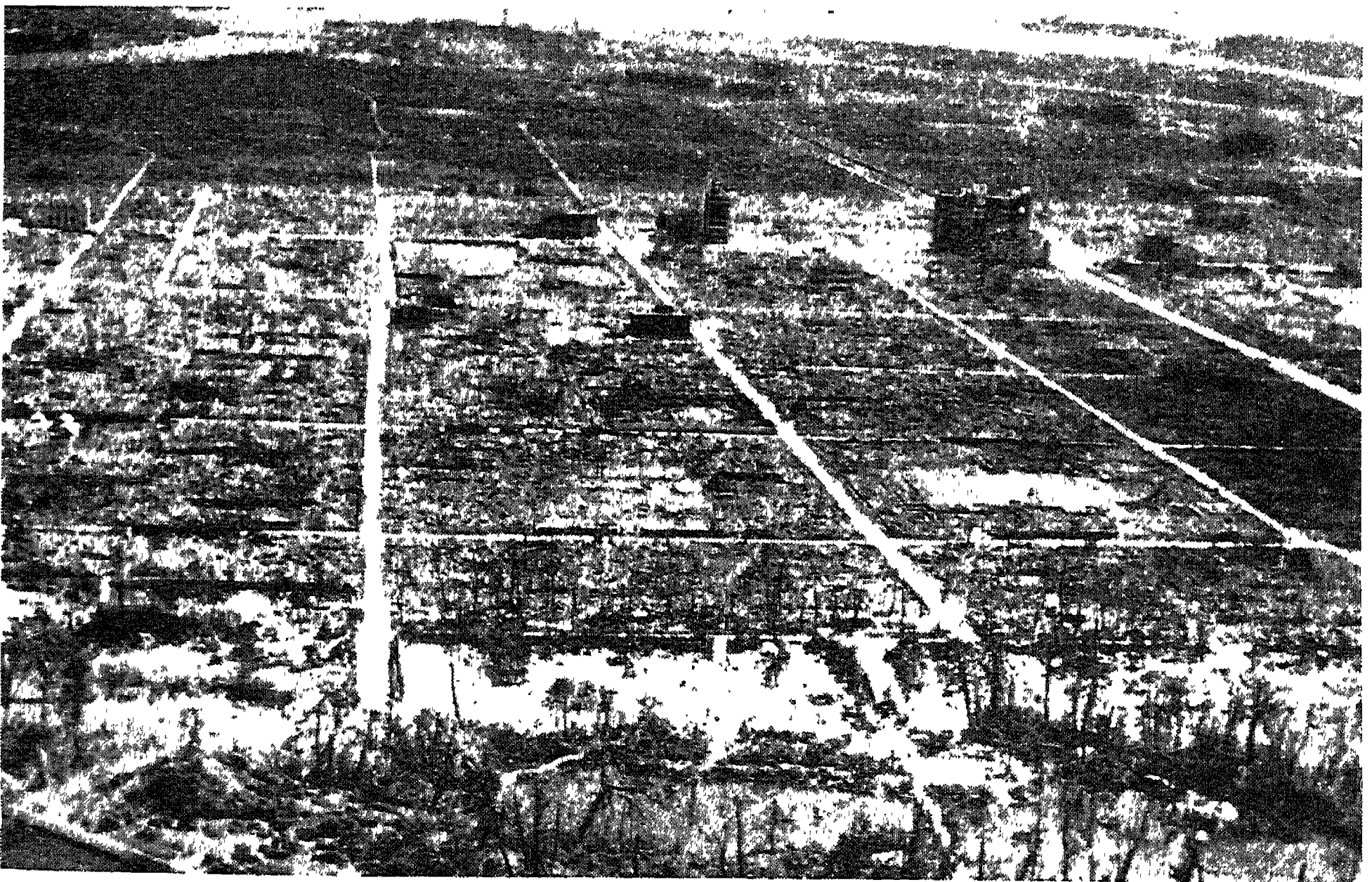
of air attack was drafted in July, 1935. In Dec., 1937, an Air Raid Precautions Act was passed, requiring local authorities in Great Britain to organize A.R.P. schemes; more than 5,000 local training schools were established. The first big A.R.P. exercise was at Southampton and Portsmouth in 1937. On Sept. 1, 1939, the day Germany invaded Poland, a reserve of some 700,000 part-time workers was created to supplement those already enrolled, and full A.R.P. machinery was put in operation, including a complete blackout. On Sept. 3, 1941, the A.R.P. organization was renamed Civil

protection against machine-gun fire and against any H.E. bomb effects except a direct hit. During the First Great War, caves near east coast towns in England were converted into air raid shelters. In the Spanish civil war of 1936-39 caves were used as shelters at Barcelona, Seville, and Madrid. The lofty promontory upon which Chungking is built is honey-combed with caves and subterranean galleries which were used as shelters during the China-Japan conflict; they could accommodate half a million people.

In the Second Great War surface shelters with walls of 13½-in.



**Air Raid.** Aerial view of the industrial section of many times raided Tokyo, taken in Sept., 1945, after Allied occupation of the city



**Air Raid.** Hiroshima, after the first atomic bomb used in warfare had exploded 1,000 ft. above it on Aug. 6, 1945: of its 343,000 people, 78,150 were found dead, 58,839 severely injured, and many of the injured died later

brickwork and roofed with reinforced concrete slabs were built in the streets of many British towns; they gave good protection against blast and splinters. For domestic protection the Anderson Shelter (*q.v.*), which could be erected in the garden, and the Morrison Shelter (*q.v.*), for use indoors, were distributed to householders.

A portable one-man "pill-box" resembling an enlarged postal pillar-box and made of heavy steel plate was provided for the use of police and others in exposed positions. Many cellars and basements in towns were strengthened with steel girders, concrete, and sandbags and used as shelters.

Only tunnels or very thick reinforced concrete could resist direct hits from heavy H.E. bombs, and in London the Underground railway stations were converted into night shelters by fitting them with tiers of bunks, together with water and sanitation; they could accommodate 175,000 people. Eight deep shelters were constructed in London. Caves at Dover were equipped with first aid and decontamination posts during the constant shelling and bombing of Dover, 1940-44; they could hold 10,000 people.

Elaborate shelters were constructed in the caves honeycombing the gorges through the plateau on which Stalingrad stands. In beleaguered Sevastopol the caves in the rock upon which the city is built housed factories, canteens, hospitals, and even newspaper offices. Caves were used as shelters at Tobruk and in Crete. Existing caves at Malta and Gibraltar were extended and reinforced to provide shelter for civilians and military supplies. The caves at Valletta could accommodate the whole population of the town.

Massive concrete shelters proof against H.E. bombs were constructed for key services, the most impressive being the citadels (*e.g.* that in London in which Winston Churchill spent many nights of the war). These had concrete walls and roofs several feet thick; most of them were built underground, complete with their own power, water-supply, food stores, and communications, so that administrative and service departments could function under the worst possible bombardment. Shelters on the Continent followed the same lines, the most famous being the U-boat pens at St. Nazaire and the Berlin "bunkers."

The development of atomic and hydrogen bombs raised new prob-

lems in the provision of air raid shelters. To be proof against atomic and hydrogen bombs a shelter must afford protection against both blast and radiation for miles from the point of a bomb's impact. After the atomic bomb attacks on Hiroshima and Nagasaki it was found that trench shelters with earth-covered reinforced roofs had withstood blast effects comparatively close to the bomb's point of impact, as did thick-walled buildings of reinforced concrete. Various fabric materials afforded protection against radiation. But it is doubtful to what extent protection against attack by atomic weapons could be adequately provided.

**Air Raid Warning.** Audible or other warning of impending enemy air attack. In the German air raids on London in 1917-18, during the First Great War, the public was warned to take cover by the firing of maroons and the sounding of police whistles. The "all clear" was sounded by Boy Scout buglers riding bicycles. A new system of signals planned in Great Britain in 1937 as part of A.R.P. led to the adoption in 1938 of the siren or hooter. Warning was sounded by emitting for two minutes a fluctuating or warbling note of a varying pitch and high penetration. This was supplemented by street warn-

ings in the form of short, sharp blasts from whistles blown by police or wardens. The "raiders passed" signal was given by a steady note from the siren, also of two minutes' duration. In the event of a gas attack it was planned to give the alarm by hand rattles, with handbells to sound all-clear. Responsibility for sounding public warnings lay with the police.

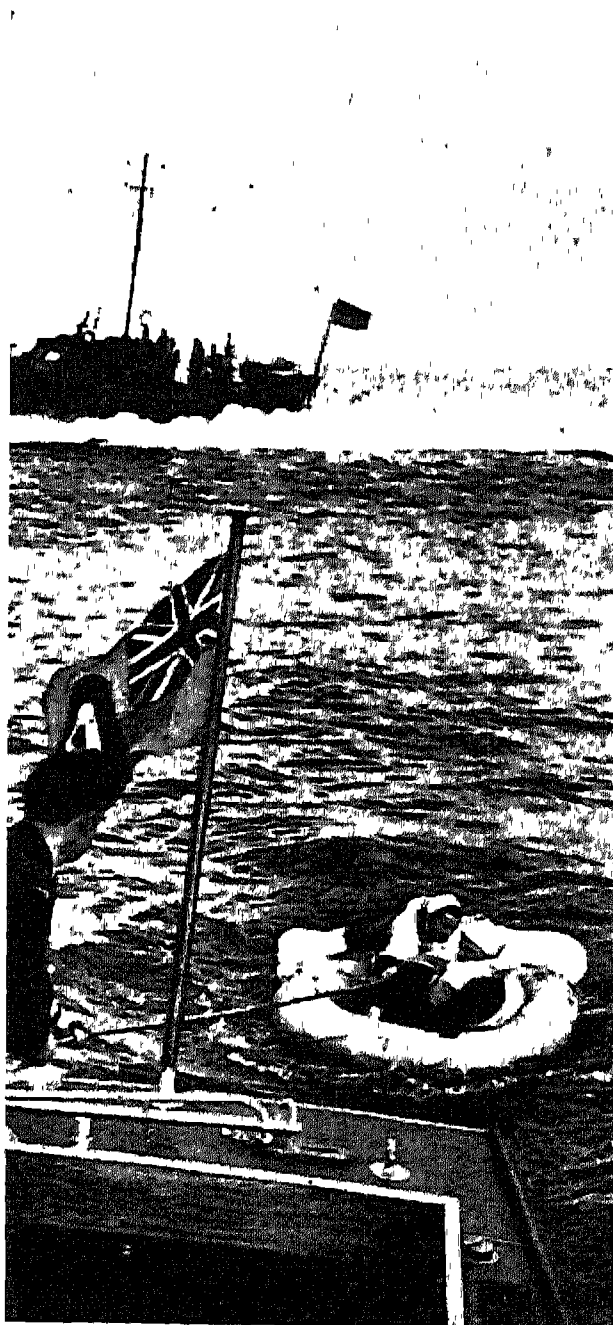
In Sept., 1940, the prime minister, Winston Churchill, referring to the "banshee howlings" of the sirens, announced that the duration of the signal would be reduced to one minute, and that it must be regarded as an "alert" rather than an alarm, so minimising interruption of work in factories and offices. A system of centralised warnings of imminent danger was introduced into government offices and war factories on Oct. 14, 1940; and other organizations followed a similar practice by introducing "roof-spotters" during alert periods. The public warnings were further modified in London and S.E. England during the flying-bomb attacks, June-Sept., 1944, when the alert was reduced from eight wails to five and there was a system of local "imminent warnings" by whistle, and by publicly displayed coloured flags: red to indicate that a bomb was heading in the direction of the flag, green to indicate that it was taking another direction.

The first air raid warning of the Second Great War in Great Britain was sounded at 11.21 a.m., Sept. 3, 1939; this was due to an unidentified French aircraft. The last was on March 28, 1945. Warnings were officially discontinued in Great Britain on May 2, 1945.

Germany adopted a system of air raid warnings similar to that used in Great Britain, with the addition of radio announcements.

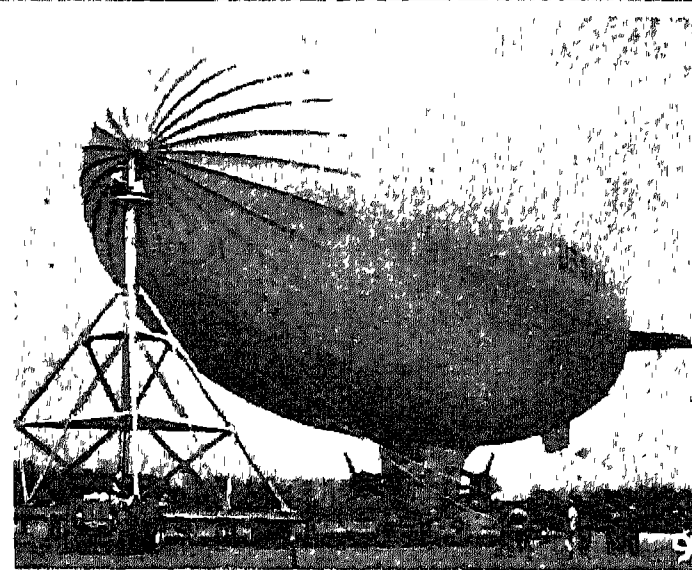
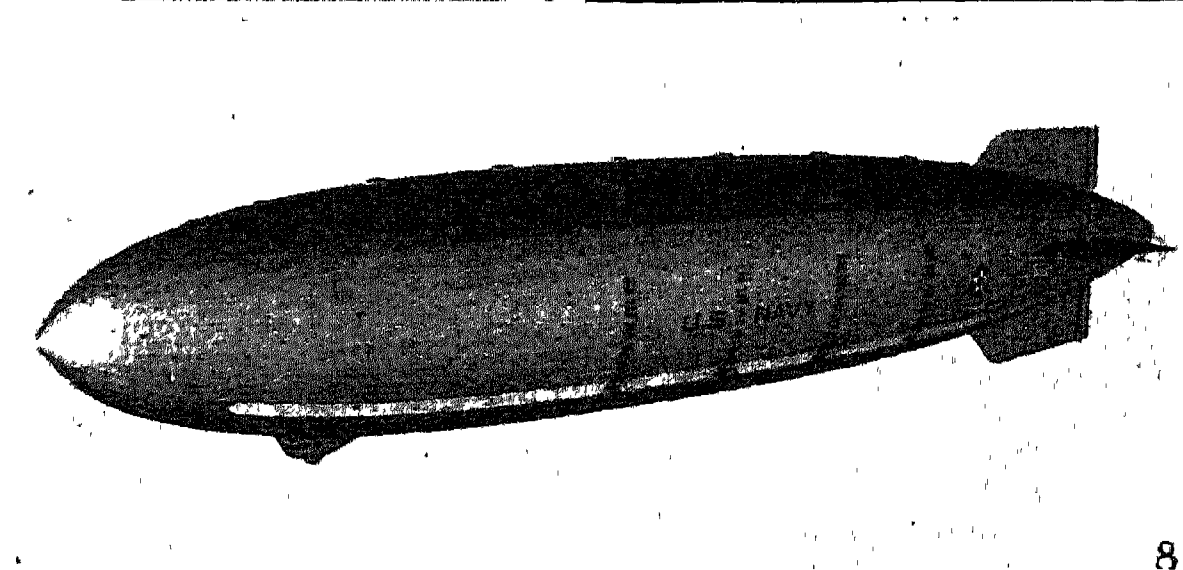
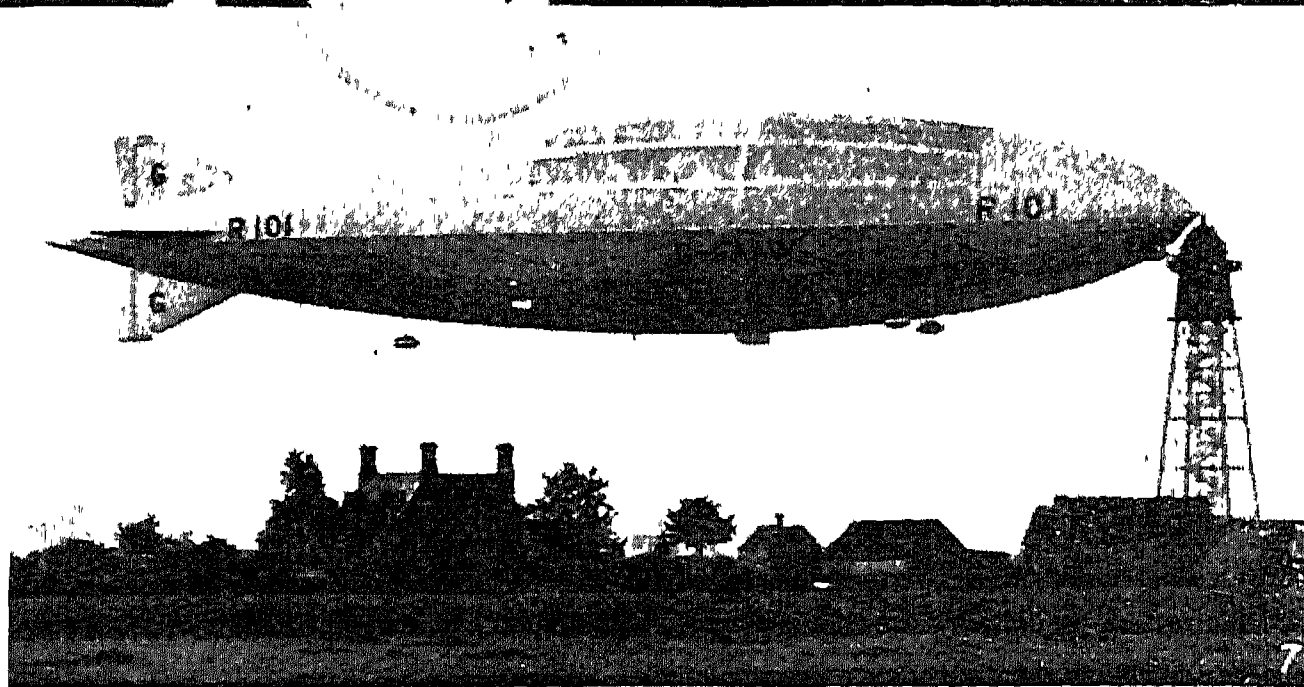
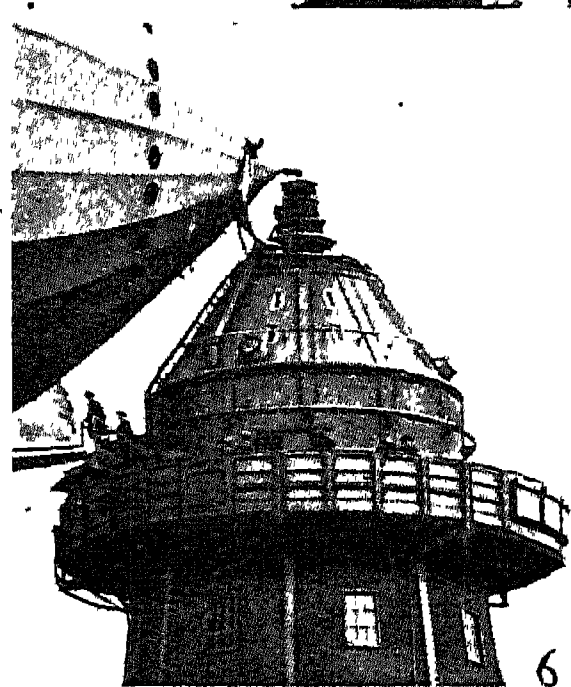
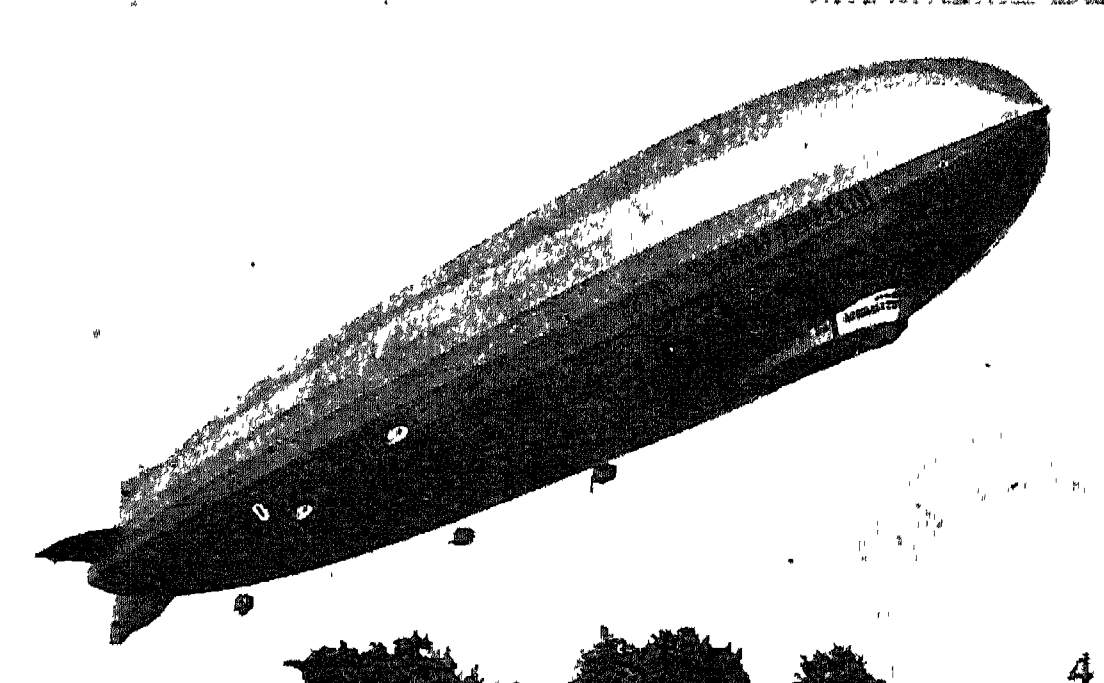
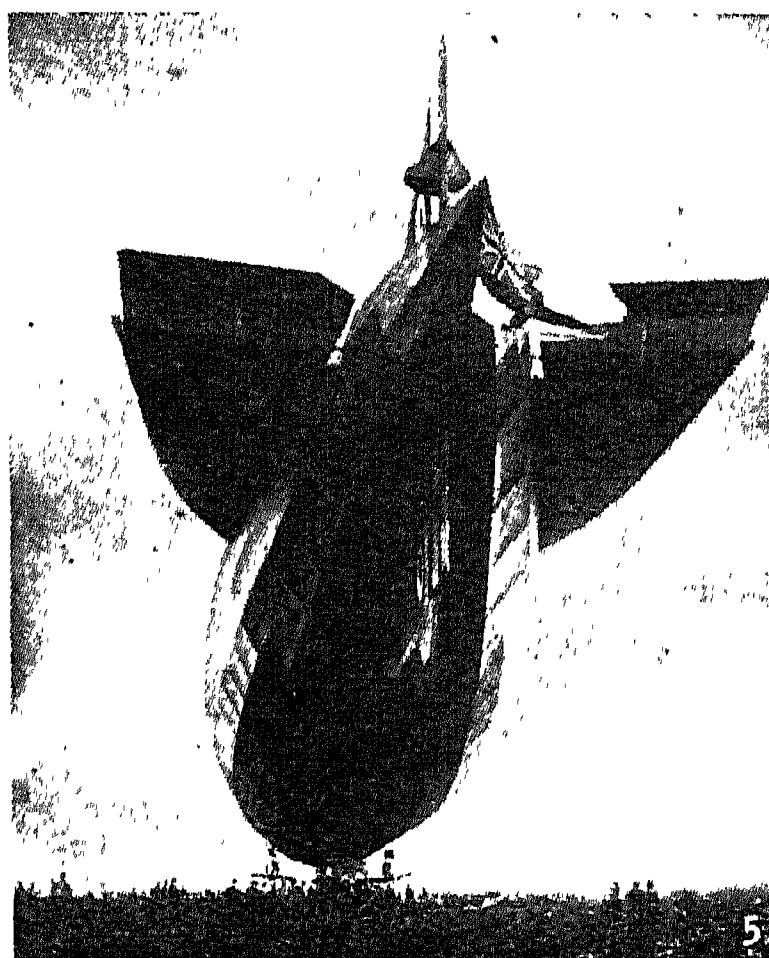
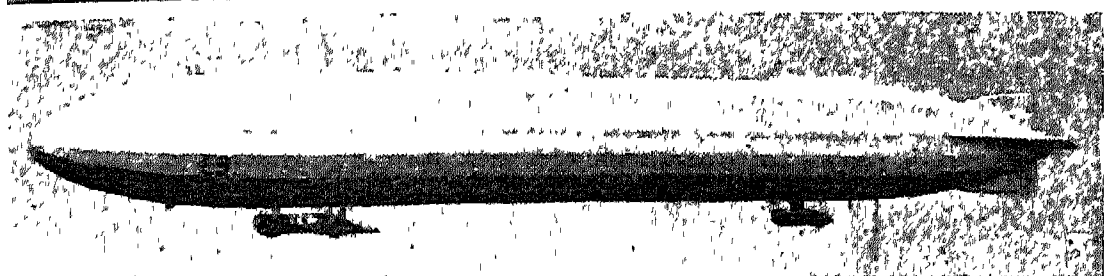
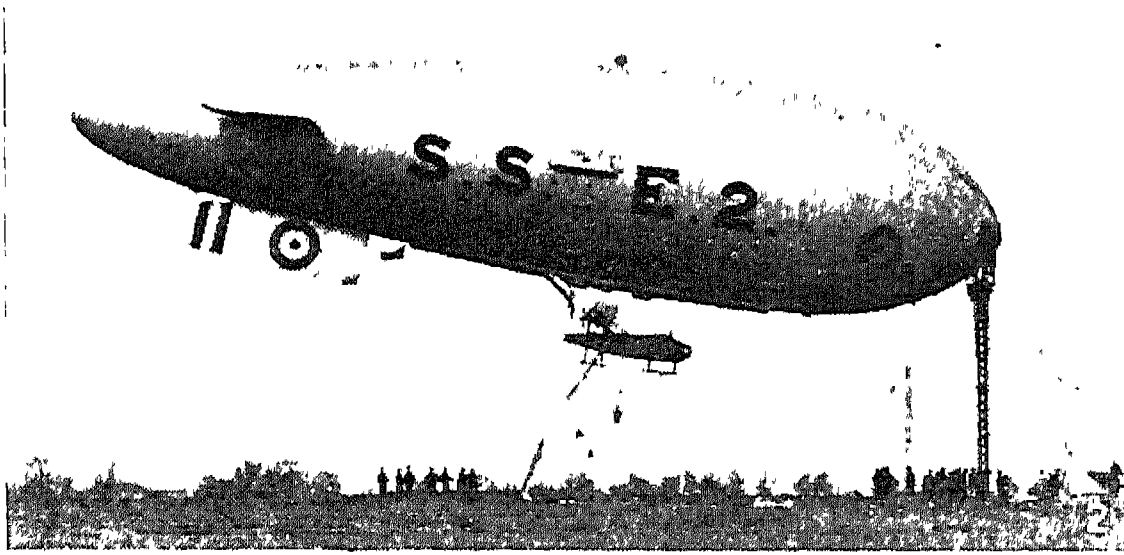
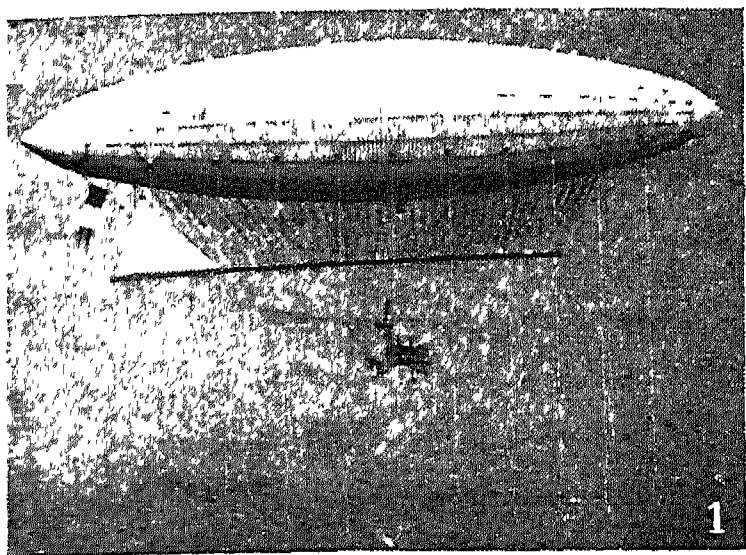
**Aircrew.** Any form of propeller driven by an engine and giving motion to an aircraft. It can be a tractor airscrew, which is located in the front of the fuselage or wings, or a pusher airscrew, mounted behind the engine on the trailing edge of the wing. On rotating, the airscrew produces a circulation of air from which motive power is derived. *See also* Aeronautics.

**Air-Sea Rescue.** Organization established in Great Britain in May, 1941, with the object of saving airmen who had been forced down into the sea and, having taken to their rubber dinghies, were in need of assistance. The organization of this service was



**Air-Sea Rescue.** A fast motor launch intercepts an air crew adrift in an emergency dinghy





1. Airship designed and built by Henri Giffard in 1852.  
2. S.S.E.2, 1919, a non-rigid airship, at her mooring mast, Pulham, Norfolk. 3. Zeppelin L9, an early rigid model, 1915. 4. Graf Zeppelin arriving at Hanworth on a demonstration flight, Aug., 1931. 5. R34 anchored

on American soil after flying from Scotland, July, 1919. 6. Top of the mooring mast of R101, showing passengers' entrance. 7. R101, completed in the autumn of 1929; lost in France in 1930. 8. U.S. airship Akron, lost in a storm in April, 1933. 9. U.S. L type of airship, 1939

#### AIRSHIP : INTERESTING AND FAMOUS TYPES FROM 1852 TO 1939

Photos, 1, model in Science Museum, S. Kensington; 2 and 9, courtesy of Lord Ventry; 3, Imperial War Museum

the Royal Navy developed an airstrip for use on water, made of linked and hinged buoyancy cans, hexagonal in shape.

**Air Training Corps.** Voluntary cadet organization established in the U.K. by royal warrant of Feb. 1, 1941, to provide training for boys proposing to enlist in the Royal Air Force or intending to perform their national service therein. Enrolment is open to physically fit youths between the ages of 15 years 3 months and 17, and training and uniform are free. Boys can attain ranks equivalent to those from corporal to warrant officer in the R.A.F., but such ranks carry no authority in that service. A.T.C. units are administered by home command of the R.A.F. through local committees. In schools where education continues beyond the age of 17, the R.A.F. sections of the Combined Cadet Force are the counterpart of the A.T.C. units in schools where there are no other service youth organizations.

A.T.C. training is in three sections: physical training and drill; proficiency training in R.A.F. duties and trades; advanced training. Various courses at R.A.F. units are open to A.T.C. cadets, and facilities are available for glider training to the standard of the A certificate (*see under Aviation*); while each year 400 cadets are taught to fly to the standard of private pilot's licence. Cadets can attend annual summer camps with their squadrons at R.A.F. stations; and selected cadets are taken on routine service flights by transport command to overseas stations.

**Air Transport Auxiliary.** Organization set up in the first month of the Second Great War for the ferrying of new aircraft from the manufacturers to R.A.F. and naval units. Most A.T.A. pilots had been private flyers before the war and were either too old or unfit for service in the R.A.F. Foreign pilots were enrolled also. In 1940 a Women's Ferry Pool was formed; Amy Johnson (*q.v.*) was among those who lost their lives in this service. A.T.A. was controlled by the ministry of Aircraft Production.

**Air Vice-Marshal.** Commissioned rank in the Royal Air Force immediately senior to an air commodore. Insignia of the rank is a broad braid ring surmounted by a narrow braid ring on the sleeves of the tunic and on the shoulder straps of the greatcoat

and raincoat, and gold leaves round the peak of the cap.

**Airy, SIR GEORGE BIDDELL** (1801-92). British mathematician



Sir George Airy,  
British astronomer

and physicist who was astronomer royal 1835-81. He re-equipped Greenwich observatory with instruments of his own design; established a magnetic and meteorological dept. in 1838; introduced in 1854 the electrical timing of transits; initiated in 1874 the prismatic mapping of solar prominences; and began in 1873 the daily recording of sunspots. In 1854 he established the mean density of the earth, and over a successive period of years catalogued all the lunar and planetary observations made at Greenwich during 1750-1830. He devised the existing method of correcting ships' compasses; advised on the laying of the first Atlantic cable; assisted in settling the disputes between Great Britain and the U.S.A. over the boundaries between Canada and Maine and Canada and Oregon; and in 1867 received the Telford medal for a paper on suspension bridges.

Airy was born at Alnwick, Northumberland, July 27, 1801, and educated at Cambridge, where in 1828 he was appointed Plumian professor of astronomy and director of Cambridge observatory. He published 377 scientific papers, 141 official reports, and 11 vols. of treatises. He died at Greenwich Jan. 2, 1892.

**Airy Disk.** In optics, the bright circle at the centre of a diffraction pattern of alternate light and dark rings, which is produced when a parallel beam of light is focused by a lens. The centre of the system coincides with the position which would be occupied by the point image of simple lens theory. The disk is called after Sir George Airy, who first considered the problem of diffraction at a circular aperture. Its existence sets the limit to the Resolving Power (*q.v.*) of an optical system.

**Aislable, JOHN** (1670-1742). English politician, remembered because, when chancellor of the exchequer, he supported the scheme for paying off the national debt which earned the name South Sea Bubble (*q.v.*). Born at York,

he became M.P. for Ripon in 1695 in right of his possession of the Studley Royal estates. He was treasurer of the navy in 1714 and chancellor of the exchequer under Sunderland in 1718. When the South Sea Bubble burst, he resigned, Jan. 1721 (N.S.), and, being found guilty of "most notorious, dangerous, and infamous corruption," was committed to the Tower of London. On his release he retired to his Yorkshire estates, a motion for confiscation of these having been rescinded.

**Aisle** (Lat. *ala*, wing). Originally the parts of the church to the left and the right of the nave, usually separated from it by a row of arches or columns. This arrangement derives from the Roman secular basilica. The word has come in general usage to mean the passage-way between the side (or wing) and the centre of a church (and where there is a third central passage-way, that also); and by extension is used for similar passage-ways in secular buildings. *Pron. ile.*

**Aisne.** River of France. Rising in the Meuse department, it flows W. and joins the Oise near Compiègne. Connected with the Meuse and Marne by canals, it is navigable for rather more than half its length of 175 m.

**Aisne.** Frontier department of N.E. France. The capital is Laon; the other chief towns are Château Thierry, St. Quentin, Soissons, and Verviers. It is watered by the Aisne, Oise, Marne, and Ourcq rivers, and by several canals. Level except to the south and with ample rainfall, Aisne is fertile, producing sugar beet, wheat, potatoes, flax, hops, and hemp. Cider and wine are made. Industries are mechanical engineering and the making of iron goods, agricultural implements, and machinery of all kinds; there are also chemical, sugar, cheese, cement, and plaster factories, flour mills, and wool and cotton-spinning mills. The sand of the department is suitable for making glass, and the factory of St. Gobain, which has enjoyed world-wide renown for its mirrors since the 17th century, also manufactures optical glasses, mainly for lighthouses, and glass bottles.

The area has suffered much from war all through its history (*see the following article for battles of the First Great War*). Yet many archaeological remains of great interest have survived, as well as churches, monasteries, and fortified castles. Area 2,866 sq. m. Pop. (1954) 487,068.

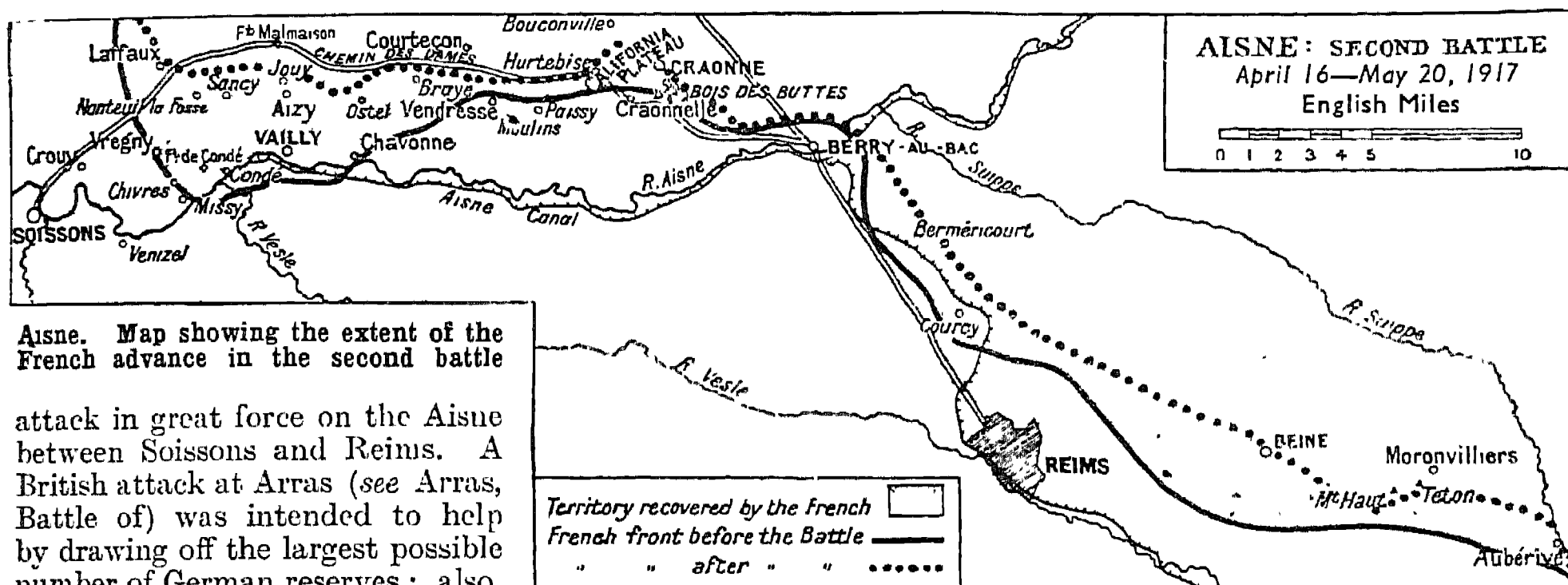


on the plateau were connected by tunnels and converted into shell-proof shelters for thousands of troops. Moreover, the Germans had the advantage in observation, being generally on the high ground along the dominating ridge.

Nivelle, newly appointed French commander-in-chief, decided to

fantry attacked in force at 6 a.m. on April 16, between Laffaux and Reims. At every point progress was impeded and communications hindered by the rough weather. The day closed with the capture of 10,000 German prisoners but only a slight advance of the French line. The Bois des Buttes

vention of the French government. Nivelle's bold plan had not succeeded. The gains of ground were unspectacular compared with what had been hoped for, and had been obtained only at the cost of 31,000 men killed and missing, and 100,000 wounded. German agents in France spread dis-



Aisne. Map showing the extent of the French advance in the second battle

attack in great force on the Aisne between Soissons and Reims. A British attack at Arras (see Arras, Battle of) was intended to help by drawing off the largest possible number of German reserves; also, in order to set free more French troops, the British front was extended. Nivelle had at his disposal nearly 800,000 men for attack on a front of 50 m. They were opposed by about 650,000 Germans. Nivelle believed that after the exhaustion of the Germans in the Somme battles of 1916 they would collapse before one vigorous blow, and he sought to penetrate their front in a single great operation. But leakage of information allowed the Germans to know his intentions and to adapt their positions accordingly. Their front line was lightly held, while large reserves were massed well to the rear, in pursuance of Hindenburg's new plan of "elastic defence."

Nivelle made no attempt at surprise. French artillery opened a bombardment which lasted ten days without intermission. The weather was stormy, with showers of sleet and snow, and air observation was too difficult to ensure the thorough destruction of German positions that had been hoped for. German guns replied at once, and the marked artillery predominance essential for a successful infantry attack was not obtained by the French. Their losses were heavy even in the initial stage as troops moved into position: whereas those of the Germans were relatively light because of their "elastic defence."

Although the battle lasted from April 16 to May 20, infantry fighting was mostly confined to the first five days. French in-

had been stormed, but with heavy loss, the French tanks used there revealing serious defects in construction. The outskirts of Craonne had been reached, Courcy, N. of Reims, captured, Berméricourt taken and lost.

During the days immediately following, the battle front was extended. E. of Reims the French captured important heights dominating the German position at Moronvilliers, and stormed Aubérive and a long system of trenches connecting that village with the German positions at Moronvilliers. The German bridge-head S. of the Aisne was carried, and firm positions were secured along the high ground of the Chemin des Dames, though the W. end of that great road was still strongly held by the Germans. German counter-attacks at the W. end of the line were repulsed.

After April 20 the fighting died down to an artillery struggle, punctuated only by occasional German attacks, all beaten off; until, on May 4, Nivelle captured Craonne and pushed forward to the high ground above, securing the E. end of the Chemin des Dames. Thenceforward the Germans had only a foothold on the plateau. Further gains were made at the other end of the front, N.E. of Soissons. Finally, on May 20, an important local French attack completed the capture of the heights dominating Moronvilliers.

The abandonment of the French offensive was due to the inter-

couragement by starting greatly exaggerated rumours of French losses. The French government became alarmed; and on April 29, Pétain, who favoured limited offensives while awaiting the arrival of the U.S. army, was appointed chief of the French general staff, and succeeded Nivelle as commander of the French north-eastern armies on May 16. By this time German propaganda was producing unhappy effects on the French army. Several acts of indiscipline culminated at the end of May in an outbreak of troops at Soissons where a whole regiment marched to the station under the red flag, demanding to go to Paris to lay its case before the Chamber. Pétain quelled the disturbances.

#### German Losses

That the total German losses in the battle were heavy was clear at the time, for nearly 30,000 prisoners were taken, as well as 227 guns. The Germans claimed that the battle had established the success of their "elastic front" tactics; if so, it was only at the price of sacrificing highly important positions. Ludendorff's memoirs suggest that if the attack had been continued as Nivelle wished, the French might have achieved decisive victory. Later in the war the "elastic front" plan failed completely in the face of more skilful Allied tactics.

As a result of further heavy fighting which broke out on the

encountered American troops, who speedily proved their quality by counter-attacking at Veully-la-Poterie and driving back the Germans in confusion. American and French troops also drove back a German battalion that had crossed the Marne at Jaulgonne. Americans attacked again on June 5 and 6 near Torcy, N.W. of (Château-Thierry, and, in conjunction with the French, drove the Germans back a mile. The Germans stormed Bligny in the morning of June 6, but the ruins were recovered by the British in the evening.

The failure of the Germans' efforts to widen their flanks brought their offensive to a close. It had secured greater results than their two earlier 1918 offensives, having carried their front to a point only 40 m. from Paris. They had made immense captures. But their primary aim, which was to inflict decisive defeat on the French army, had not been attained; and their own losses in the offensive reached 150,000. The Allied losses, though serious, could be replaced from the American army, a fresh and comparatively inexhaustible source such as the Germans could not draw upon.

The Aisne was finally cleared of Germans during the last great Allied offensive in early Oct., 1918.

**Aïssé**, MADEMOISELLE (c. 1694–1733). Circassian letter-writer. The daughter of a chief whose home was pillaged while she was a child, she was sold to the Comte de Ferriol, French ambassador at Constantinople, who sent her to the household of his sister-in-law at Paris. There her history and beauty combined to win her great popularity, and Philip, duke of Orleans, courted her openly. But she gave life-long affection to the Chevalier d'Aydie, by whom she had a daughter. In her letters to Madame Calandrini are some shrewd portraits of people of the period. Aïssé died March 13, 1733. Her letters, edited by Voltaire, were published in 1787. Her story may have suggested to Dumas the character called Haidée in *The Count of Monte Cristo*.

**Aistulf** OR ASTOLF (d. 756). King of the Lombards. He succeeded his brother Rachis in 749; in 750 Ravenna was in his hands and he marched on Rome. The pope, failing to obtain help from the emperor Constantine V, appealed in person to the Frank mayor of the palace, Pepin, or Pippin, whom he anointed king

of the Franks. In 753 Pippin defeated Aistulf and made him promise to give up the captured territory. Aistulf broke this promise and besieged Rome, 756. Pippin again defeated him, and Ravenna and part of the exarchate passed from the Lombards to the popes.

**Aitchison**, CRAIGIE MASON AITCHISON, LORD (1882–1941). Scottish judge. He was born Jan. 26, 1882, and educated at Falkirk high school and Edinburgh University, winning the Muirhead prize in civil law. Called to the bar in 1907, he became a K.C. in 1923. One of his successes as counsel was obtaining in 1929 the annulment of the verdict of murder against Oscar Slater (*q.v.*), passed 20 years earlier. Having entered parliament as Labour member for Kilmarnock Burghs in 1929, he became lord advocate for Scotland, and continued to hold that office as National Labour member from 1931 until in 1933 he became lord justice clerk and a life peer. He served on the Scottish educational committee of the privy council. He died at Edinburgh, May 2, 1941.

**Aitken**, ROBERT GRANT (1864–1951). American astronomer. Born at Jackson, Calif., Dec. 31, 1864, he studied astronomy at Williams College, Mass., became in 1891 a professor at the College of the Pacific, and in 1895 went as assistant to Lick Observatory, of which he became director, 1930–1935. His outstanding work was the discovery of over 3,000 double stars and the calculation of their orbits and those of many comets. He was awarded the Royal Astronomical Society gold medal in 1932. He died Oct. 29, 1951.

**Aiton**, WILLIAM (1731–93). British botanist. Born in Lanarkshire and brought up as a gardener, he was appointed assistant at the Botanic Garden at Chelsea and in 1759 to the management of that at Kew. He remained there for the rest of his life, also looking after the royal pleasure gardens at Richmond, and died Feb. 2, 1793. Aiton spent sixteen years on his *Hortus Kewensis*, a catalogue of the plants at Kew, the variety of which he had done much to increase; this was published in 1789. His eldest son, William Townsend Aiton (1766–1849), succeeded to the posts at Kew and Richmond and carried out work for George IV at Windsor and Brighton. He brought out a second edition of the catalogue

and helped to found the Royal Horticultural Society.

**Aitutaki** OR AILUTAKI. One of the Cook Islands, Pacific Ocean, a dependency of New Zealand. Discovered by Captain Cook in 1777, it is 9 m. long and 21 m. in circumference. With a few other islets, it is surrounded by a coral reef enclosing a lagoon. Coconut palms abound. Pop. (1954) 2,555.

**Aix**. Islet off Charente-Maritime, France. It has a sheltered roadstead which is the outer harbour of Rochefort. Two miles W. of the coast, it is  $\frac{3}{4}$  m. long by  $1\frac{1}{2}$  m. wide. In 1815 Napoleon embarked here on the *Bellerophon* for St. Helena. The Gourgaud museum, Aix, contains many Napoleonic relics. Pop. (1954) 164.

**Aix-en-Provence**. City of France in Bouches-du-Rhône department. It is 18 m. by rly. N. of Marseilles. Already a town of ancient Gaul, it grew round warm mineral springs—still in use—where the Romans built baths in 123 B.C. Destroyed by the Visigoths, the Franks, and the Saracens, it has always risen from its ashes. It became the capital of Provence in the 9th century, and from the 12th a centre of artistic and literary activity. In the time of King René (15th century) it was at its height, a town of wealthy merchants with a university (now incorporated with that of Marseilles) and a *parlement*. In 1948 an annual international music festival was started. The seat of an archbishopric, Aix has an academy, a faculty of law and of letters, and a court of appeal.

Its artistic treasures are many: the cathedral of S. Sauveur, in which all styles from the 5th to the 16th century are represented, has a charming romanesque cloister; there are a 17th-century town hall, a number of remarkable fountains, and beautifully ornate 17th- and 18th-century mansions with wrought iron balconies and lovely carved doors. The museum has some uncommon tapestries. Mirabeau was deputy for Aix at the time of the Revolution. Among the celebrities born at Aix were Vanloo the painter, Vauvenargues the moralist, Monseigneur de Moillis whom Victor Hugo depicted in *Les Misérables*, and Cézanne the painter. Pop. (1954) 54,217.

**Aix-la-Chapelle**. French and historic name of Aachen, city of W. Germany, in the *Land* of North Rhine-Westphalia. It is 45 m. by



of Europe by discussion rather than force.

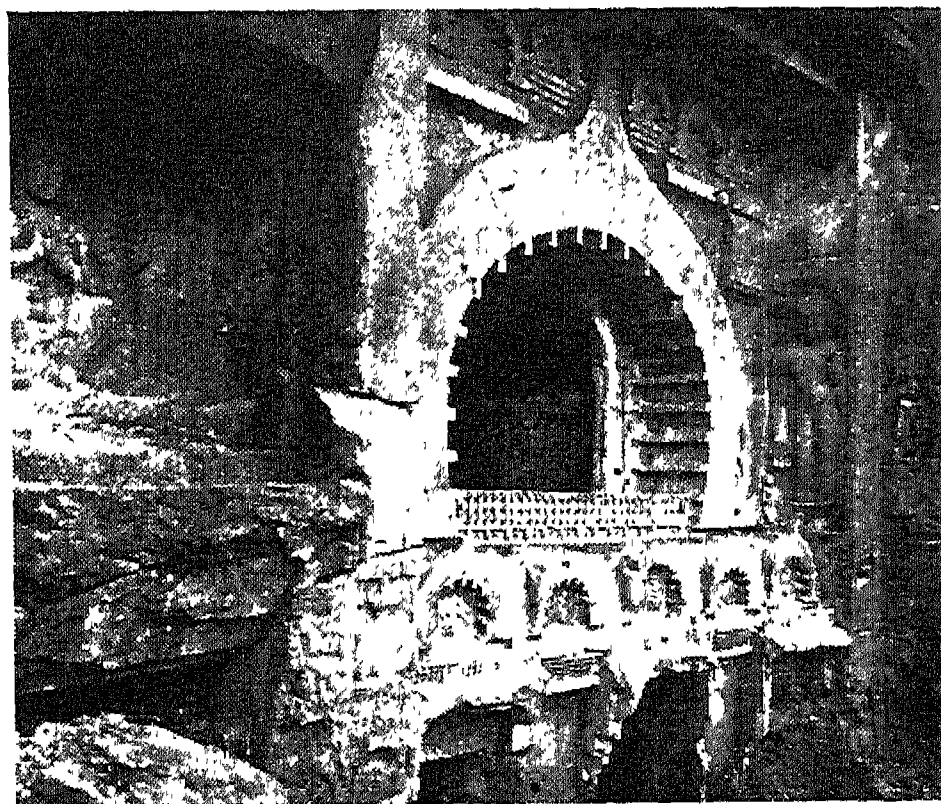
**Aix-les-Bains.** Town of S.E. France, in the department of Savoie. A favourite spa with a mild climate, it is 8 m. by rly. N. of Chambéry, and 823 ft. above sea level. Its warm springs are beneficial to sufferers from rheumatism and gout. As *Aquae Gratianae* it was known to the Romans, ruins of whose temples, baths, and triumphal arch remain. Barely 2 m. away is the Lac du Bourget, subject of a celebrated poem by Lamartine. The Germans reached Aix-les-Bains on June 24, 1940, withdrawing later until they occupied Vichy France in Nov. 1942. The town was liberated by the F.F.I. on Aug. 26, 1944. Pop. (1954) 15,680.

**Ajaccio.** Capital of Corsica. Situated on the W. coast, on the N. shore of the Gulf of Ajaccio, it is connected by rly. with Calvi and Bastia, by steamship with Marseilles and Nice, by air with Marseilles and Paris. The seat of a bishopric since the 7th century, it has a cathedral, colleges, library, museum, the house in which Napoleon I was born, and a large harbour protected by a citadel. It exports wood, wine, oil, grain, sardines, anchovies, coral, hides, chestnuts, and cork, and manufactures tobacco. Near by zinc, lead, tin, and mercury are found. Its mild climate makes it a favourite winter resort. Under the Vichy govt., June, 1940, to Nov. 11, 1942, when Italy occupied Corsica, Ajaccio was liberated between Sept. 10 and 17, 1943, by its own citizens, helped by French troops landed here in the night of Sept. 13-14. Pop. (1954) 32,997.

**Ajalon** OR AIJALON. Town assigned to the tribe of Dan (Josh.

10) but not occupied by it. The town has been identified, though not certainly, with the modern Yalo, 14 m. N. of Jerusalem. The Valley of Ajalon is memorable for the defeat of the Canaanites by the Israelites, when the sun and moon stood still at the word of Joshua. Judges 12, v. 12 mentions an otherwise unknown town of the same name in Zebulun.

**Ajanta.** Village in Hyderabad state, India, in Aurangabad district. Near by are the celebrated Ajanta Caves, excavated from the high cliffs along the Waghora river. The caves were hewn from solid rock by Buddhist monks, and are assigned to a period from the 2nd century B.C. to the 6th century A.D. They are 29 in number: 24 *viharas* or monastery caves, and 5 *chaityas* or temples. Many are supported by lofty pillars and they are richly ornamented with sculp-



Ajanta. Entrance to one of the Buddhist temples carved from solid rock, in Hyderabad state, India

tures and covered with paintings. Few seem to be completely finished, but all bear evidence of painting on walls, ceilings, and pillars, both inside and out.

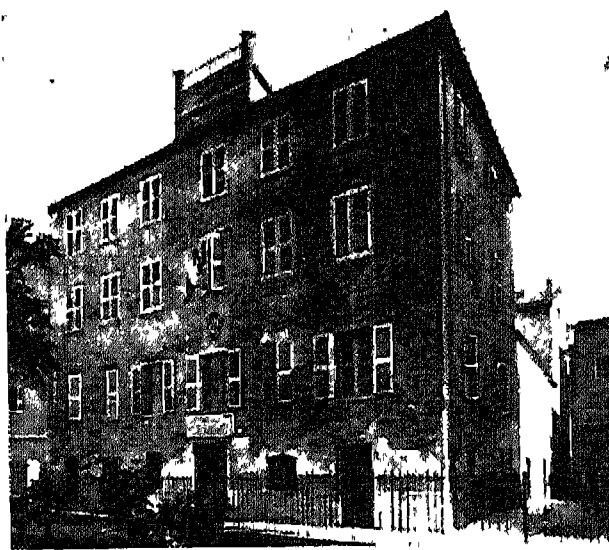
The dimensions of the caves vary, the largest extending almost 100 ft. into the cliffs, with a width over 40 ft. and a height over 36 ft. In design they are said to be rock-cut replicas of the wooden architecture of the day.

The paintings are of outstanding quality, and furnish a record of Buddhist art over 800 years. The main themes centre on the *Jakata*, legends of the Buddha's reincarnations, and represent tenets of Buddhist thought. The paintings are distinguished by a variety of human activity, much of it of a courtly nature, and by natural scenes and figures, all illuminated by a religious piety. See illus. at Buddhist Antiquities.

**Bibliography.** The Paintings of the Buddhist caves of Ajanta, Griffiths, 1896; *Ajanta Frescoes*, Herringham, 1917; *Ajanta*, Yazdani, 3 vols. and 3 cases of plates, 1933-1946; *India: paintings from Ajanta*, U.N.E.S.C.O., 1954.

**Ajax.** Safety blasting explosive permitted for use in the United Kingdom. Ajax powder has the following composition: nitroglycerine, 22.5 p.c.; potassium perchlorate, 37.2 p.c.; collodion cotton, 0.8 p.c.; wood-meal, 11 p.c.; dinitrotoluene, 3.5 p.c.; ammonium oxalate, 25 p.c.

**Ajax.** In Greek legend, the name of two heroes who fought for the Greeks in the Trojan War. One was the son of Oileus, the other the son of Telamon. Ajax, surnamed *Loerian*, the son of Oileus, though small of stature, was fleet of foot and a skilful fighter. Because he had profaned



Ajaccio. General view of the port of the capital of Corsica. It is situated on the north shore of the Gulf of Ajaccio. Above, house in which Napoleon I was born on Aug. 15, 1769

devotional writer. His family name was Hammerken, and he was born at Kempen, near Düsseldorf, the son of peasants. When he was 12 he began to attend a school at Deventer, in the Netherlands, conducted by the Brothers of the Common Life. Its founder, the saintly Gerhard Groot, was one of the heroes of his boyhood.

Always seeking solitude and preferring only the company of books, à Kempis went about 1400 to the Augustinian house of Mont S. Agnes, near Zwolle, where his brother was prior. Here in 1406 or 1407 he took orders, and here he spent the rest of his life. Occasionally he held office in the community, but the greater part of his time was occupied in writing chronicles of his order, biographies, books of devotion, hymns, and sermons, and copying MSS. He made a complete copy of the Bible as well as copies of missals and books of hours.

His numerous writings include *The Solitary Life*, *The Discipline of the Cloister*, and *The Soul's Soliloquy*. His most famous work, *Imitatio Cristi* (the imitation of Christ), written probably during 1415-25, had as its object a closer following of the counsels of perfection by those vowed to the religious life. The earliest printed copy of the Imitation was published at Augsburg in 1471 or 1472; the first English translation was printed in 1502. Among later English translations were John Wesley's, 1735; Challoner's, 1737; Payne's, 1763. By the end of the 19th century more than 3,000 editions had been issued. New editions and translations are frequent. The authorship has been disputed; but available evidence is in favour of à Kempis.

**Akenside, MARK** (1721-70). British poet and physician. Born at Newcastle-upon-Tyne, Nov. 9, 1721, and intended for the Non-conformist ministry, he turned from theology to medicine, studying first at Edinburgh and then at Leyden, where he graduated in 1744. Returning to England, in that year he published *The Pleasures of Imagination*, a didactic poem in blank verse, which won immediate recognition. He practised as a physician at Northampton and at Hampstead, but achieved little success until his friend Jeremiah Dyson made him an allowance of £300 a year.

Made fellow of the College of Physicians, 1754, and principal physician at S. Thomas's Hospital, 1759, he virtually abandoned

literature. He died in London June 23, 1770. Akenside appears in Smollett's *Peregrine Pickle* as the physician who provides a banquet in the style of the ancient Romans.

**Akershus.** See AGGERSHUS.

**Akhetaton.** City of ancient Egypt, on the right bank of the Nile, founded about 1365 B.C. by Akhnaton when he withdrew his court and capital from ancestral Thebes. He named the new city Akhetaton, meaning horizon of Aton (the sun god). The ruins of Akhetaton show clearly, as nowhere else, the lay-out of a great Egyptian city, with its palaces, temples, houses, and villas, and a village of four-roomed houses for workmen. Rock tombs in the desert cliff contained pictures of daily life in the city and its public buildings. The better-class houses had their bathrooms with drains. The many noblemen's estates made it rather like a garden city. Here were found the famous Tell el-Amarna (*q.v.*) letters.

**Ak-Hissar** (Turk., white castle). Town of Turkey-in-Asia, 31 m. N.E. of Manisa. It trades in manganese, cotton, tobacco, grain, olives, raisins. On the site of the Greek Thyatira, it was already an old town site when the Greeks re-peopled it in 290 B.C.; one of the Seven Churches of Asia was here. Pop. (1950) 23,579.

**Akhmin.** Variant transliteration of Ekhmin (*q.v.*), a town of Egypt.

**Akhnaton,** IKHNATON, OR KHUENATEN. Egyptian king of the XVIIIth dynasty, about 1370 B.C. A son of Amenhotep III and the husband of Nefertiti (*q.v.*), he began his reign as Amenhotep IV. He abandoned Amon worship for that of the solar disk, Aton, and changed his name and capital accordingly (see Akhetaton). This monotheistic reform was brief, hardly surviving Akhnaton's death, c. 1352 B.C. See *under Egypt*, Ancient; consult Tell el-Amarna, J. D. S. Pendlebury, 1935.

**Akhtyrka.** Town of the Ukraine S.S.R., about 65 m. N.W. of Kharkov. In a fertile fruit-growing district, it trades in agricultural produce and manufactures woodwork, pottery, small metal

objects and machine parts, and sheepskin coats. Pop. (est.) 29,000.

**Akita.** Seaport of Japan, on the W. coast of Honshu. The capital of the prefecture of Akita, it has rice markets and manufactures silk and cotton cloth. Pop. (est.) 42,800.

**Akka.** Turkish name of the ancient city of Acre (*q.v.*), called in full St. Jean d'Acre.

**Akkad.** Ancient name of N. Babylonia, the kingdom of the dynasty of Agade (*q.v.*) who commanded a short-lived empire from the Mediterranean to the Persian gulf. Sumer and Akkad remained geographical terms till Assyrian times.

**Akkerman.** Former name of Belgorod-Dnestrovsky (*q.v.*), a town of Ukraine S.S.R.

**Akma Dag.** Alternative transliteration of Alma Dag (*q.v.*), a mountain range of Turkey-in-Asia.

**Akmolinsk.** Town of Kazakh S.S.R., capital of a region of the same name. Situated N.E. of the Aral Sea, 280 m. S.W. of Omsk, on the Ishim, the town was founded in 1862, and is an important traffic centre and market for grain, dairy products, hides, and meat. Agricultural machinery is made, and there are sawmills. Pop. (est.) 15,800. The region, drained by the Ishim river, is a rich agricultural area, with grain growing, dairy farming, and sheep rearing. Coal is mined near the town of Akmolinsk. Area 59,000 sq. m. Pop. (est.) 440,000.

**Ako.** Israeli name of Acre (*q.v.*), seaport of Israel.



Akhnaton and his queen Nefertiti making offerings to the sun-god Aton, whose rays stream down on them in blessing: carving from a rock tomb at Tell el-Amarna

**Akola.** Town of India, in Madhya Union, headquarters of a district of the same name. Assigned by the nizam of Hyderabad to the British in 1853, the dist., area 4,110 sq. m., produces wheat, cotton, aniseed, opium,



negroes, with a few hundred (Red) Indians, etc. Alabama was first visited by Spaniards, and in 1539 by De Soto. The French settled there in 1702. It was ceded to the British in 1763 and gradually acquired by the U.S.A. Alabama was one of the secession states in 1861, a Confederate govt. being set up at Montgomery on Feb. 8. *Consult* Alabama, a History, M. B. Owen, 1938.

**Alabama Claims.** Dispute between Great Britain and the U.S.A. On July 29, 1862, during the American Civil War, the Alabama, a vessel just built at Birkenhead, sailed for the Azores. There she was armed, and, hoisting the Confederate flag under Captain Semmes, did enormous damage to the shipping of the North until sunk June 19, 1864, off Cherbourg, by the U.S.S. Kearsage.

The Federal government laid the blame for the damage done on Great Britain. Contrary to the proper observance of neutrality, the vessel had been allowed to leave an English port, although the United States consul at Liverpool had acquainted the authorities with her real character. By the time the seizure of the vessel had been ordered she had sailed. In 1871 a treaty for the settlement of the question by arbitration was signed at Washington. The claims included those for damage done by two other vessels, the Florida and the Shenandoah.

The five arbitrators were Sir Alexander Cockburn for Great Britain, C. F. Adams (1807-86) for the U.S.A., and one each from Italy, Switzerland, and Brazil. They met at Geneva Dec. 15, 1871, under the presidency of the Italian representative, and adjourned until the following June. After a disagreement affecting indirect claims had been settled, the arbitrators decided unanimously that Great Britain was responsible for the damage done by the Alabama, and by a majority that she was responsible for that done by the other vessels. The final award was signed Sept. 14, 1872, the damage being assessed at \$15,500,000, then about £3,230,000.

**Alabamine.** Name formerly used for a chemical element of the radio-active series, atomic no. 85. It was first isolated in 1940 when it was re-named Astatine (*q.v.*).

**Alabaster.** Massive translucent form of gypsum. It is often found associated with salt deposits in the form of beds and nodular

masses. It occurs in the Triassic rocks of Britain, and is used as an ornamental stone. According to Pliny, the name is derived from Alabastron, a town in Egypt whence it was obtained. A calcite alabaster was used in ancient times for ointment vases. Banded marbles of this type came from Algeria, Egypt, and Mexico.

**Alabat.** One of the smaller of the Philippine Islands. Lying to the N. of the Luzon isthmus, in Lámon Bay, it covers an area of 95 sq. m., and has a well-wooded interior. It is thinly populated.

**Alachua.** Former Seminole town of Florida, U.S.A. It was settled about 1710 by Creeks, who came from Oconee in Georgia, and the name was later made to cover other villages in the neighbourhood. The Alachua Indians resisted the incursion of white colonists early in the 19th century, and were prominently concerned in the Seminole War of 1835-42.

**Ala Dagh.** Mountain range in Turkish Armenia, N. of Lake Van. The alt. is about 11,400 ft.

**Aladdin.** Hero of a story included in most English and French versions of The Arabian Nights' Entertainments, although not in any Arabic text of The Thousand and One Nights. The story tells how Aladdin, the son of a poor widow, meets an African magician and becomes possessed of a wonderful lamp. Helped by the genie, who appears whenever the lamp is rubbed, Aladdin provides himself with jewels and fine clothes, and wins the hand of Princess Badroulboudour, the sultan of China's daughter. The magician employs all his arts to regain the lamp, among other devices offering, in the guise of an itinerant merchant, "new lamps for old." The magic lamp which fulfils its owner's wishes occurs in the folk-lore of nearly all Europe as well as that of India and China.

**Alagoas.** Maritime state of Brazil, on the Atlantic coast, between Pernambuco and Sergipe. Coastwards, where there are lagoons, the country is low and marshy; to the N.W., mountainous and forested. The products include sugar, dye-woods, cotton, tobacco, and coffee. There is rly. connexion with Pernambuco. Maceió is the capital and chief port. Other towns are Alagoas and Penedo, a port on the São Francisco. Area 10,730 sq. m. Pop. (1950) 1,103,454.

**Alagon.** River of Spain. It flows 120 m. to the Tagus, near Alcantara, and is noted for its fish.

**Alais** OR ALÉS. Town of France in the department of Gard. It lies on the Gardon, a very shallow river, at the foot of the Cévennes, 25 m. N.W. of Nîmes, and is a junction on the Paris-Lyons rly. Its buildings include the church of S. John, a citadel, and a school of mines. It has many silk mills and is an important centre of silk-worm raising. In 1847 an epidemic threatened to wipe out the silkworms here; Pasteur, called to the rescue from Paris, sought the cause of the disease for four years before he found it, and a remedy. Alais raised a statue to its benefactor. In an area producing coal, iron, lead, zinc, and asphalt, it has large iron works and glass, brick, and tile factories. It was taken from the Huguenots by Louis XIII in 1629 when the peace of Alais ended for the time-being the wars of religion in France. Pop. (1954) 36,893.

**Alai Tagh.** Mt. chain in Kirghiz S.S.R., a western continuation of the Tian-Shan system. The Trans-Alai, a parallel chain on the S. side of the Alai valley, includes Mt. Stalin (24,600 ft.) and Mt. Lenin (23,390 ft.).

**Alajuela.** Capital of Alajuela prov., Costa Rica. It is 15 m. W. of San José on the rly. to Punta Arenas and on the Pan-American highway, and trades in sugar, coffee, cattle, and lumber. Pop. (1950) 13,903.

The prov., a stock raising and lumbering region, contains also the Aguacate gold mines, and has an area of 3,700 sq. m. Pop. (1950) 148,850.

**Alalakh.** Ancient city of north Syria. On the site of the modern Tell Atchana, on the river Orontes, W. of Aleppo, it was excavated by Sir Leonard Woolley during 1936-49. In the 18th century B.C. Alalakh was a royal city of the Amorite kings of Yamkhad (*q.v.*); its temples and palaces were rebuilt and enlarged in the 15th and 14th centuries when the kingdom of Mukish fell successively under the domination of Egypt, Mitanni, and the Hittites. The last city was destroyed c. 1194 B.C. by the hordes of the Sea Peoples (*see* Egypt: Ancient). *Consult* A Forgotten Kingdom, C. L. Woolley, 1952.

**Alameda.** City of California, U.S.A., in Alameda co. It is on San Francisco Bay, opposite San Francisco and adjacent to Oakland, and is a summer resort, with shipbuilding, petroleum, and earthenware industries. Pop. (1950) 64,430.

for just such a move. After two days of fierce fighting, with heavy tank losses on both sides, the 8th army held Rommel. Throughout Sept. 2 his armour remained massed behind the British lines, under heavy shell fire; then, on Sept. 3, 4. and 5, it withdrew, leaving 42 German and 11 Italian tanks and nearly 700 motor vehicles behind it.

Alexander was now free to prepare his great counter-stroke. At last he was to have equipment in plenty and of the type he needed—better tanks and more of them, Crusaders and Grants and the 300 Shermans, originally allotted to the U.S. army, which the U.S. president had so generously diverted; an adequate tank recovery and repair organization; more and better guns, notably self-propelled guns and the 6-pounder anti-tank; vastly expanded air forces, which included three (by Jan., 1943, eight) squadrons of the U.S. 9th A.A.F.; and the organization for greatly developed lines of communication.

As to training, too, the 8th army had profited by its hard experience. In the fighting ahead it was to use a new technique of armoured warfare in face of mines and anti-tank guns; it was to revert to those old principles of artillery employment, centralised control and concentration of fire, and so to make the best use of its guns; and it was to perfect a system whereby concentrated air power could be applied at the decisive point in the minimum of time. Moreover, the 8th army, closing from the E., would be but one claw of the pincers, the other claw of which would close from the W. at Casablanca.

Alexander would not attack, however, until he had won command of the air and completed his preparations for the pursuit across Cyrenaica. Meanwhile the ceaseless attacks on Rommel's communications, both by aircraft and by submarine, continued. Soon his ammunition and petrol reserves began to run dangerously low, but he still maintained the equivalent of about 12 divisions.

By Oct. 23 the preliminary battle of the air had been won, and Montgomery had completed his concentration at Alamein for the land battle. Between sea and depression, the two opposing armies faced each other, behind their two front lines of minefields and strong-points.

The popular legend, fostered by semi-official accounts of the battle, that Rommel deliberately weak-

ened his centre as a trap for the 8th army is untrue. In fact, Axis troops, commanded by Gen. Stumme—Rommel had gone to Germany sick in Sept.—were fairly evenly divided. The N. sector, held by two Italian and one German divs., was stronger than the S., held by the best of the Italian divs. Stumme split his armour into battle groups, stationed evenly along the whole front.

Montgomery, with Alexander's approval, proposed to make his main attack in the N., where Stumme's front was strongest, and a secondary attack in the S. To this end he had divided his own front between two corps; in the N. he had placed the 30th corps, whose five infantry divisions were to deliver the main attack; in the S. the 13th corps, whose two infantry divisions—together with the 7th armoured division and the Fighting French—were to deliver attacks mainly diversionary in character.

#### The British Attack

At 9.40 p.m. on the bright moonlight night of Oct. 23, nearly 1,000 guns massed on a 6-mile front in the N. opened a 15 minutes' counter-battery bom-



Alamein. Australians approaching an enemy strong-point under cover of a smoke screen on Oct. 24, 1942

bardment of Stumme's gun-positions. Then, at 10 p.m., both the 30th and the 13th corps attacked. At the same time the new 10th corps, consisting of the 1st and 10th armoured divisions which had been held far back behind the front, moved up secretly behind the 30th corps, ready to break through as soon as the 30th corps had punched a hole for it.

Such was the plan as originally conceived. And such was the plan as finally carried out—with this difference: the time which the 30th corps would take to prepare the way for the tanks had been estimated as a matter of hours, whereas in the outcome nine days of infantry fighting and air attack

proved necessary. The two armoured divisions, however, were committed as early as Oct. 24 according to the original plan, and there followed anxious days of indecisive fighting marked by heavy tank losses. At last, Oct. 26-28, the 1st armoured div. of 10th corps with the 7th armoured div. of 13th corps and the New Zealand 2nd div. were withdrawn to reorganize.

Stumme died of a heart attack on Oct. 23, and Rommel was back in command on the 26th. Massed Axis tank attacks followed, but were beaten off. Then at 1.05 a.m. on Nov. 2 the N.Z. 2nd div. with 151 and 152 bdes. under command delivered a new attack. The breach was made, and the 10th corps passed through, followed by the 7th armoured div. By this time Rommel, too, had concentrated all his armour in the N., and by 6 a.m. on Nov. 2 the opposing armour met in head-on collision. In the heavy fighting that followed round Tell el Aqqaqir (Akakir), the 1st armoured div. and the 9th armoured bde. particularly distinguished themselves. By the night of Nov. 2-3 Rommel's armour was broken, and he had begun to withdraw. By Nov. 4 he was in full retreat, pursued by the R.A.F. and 10th corps, now regrouped for pursuit with 1st, 7th, and 10th divs. under command.

From the N., meanwhile, the 2nd New Zealand division had swung S. across the line of retreat of the Italians, who—th e i r

transport commandeered by the Germans—surrendered in droves. In all, the battle cost Rommel 55,000 men (two-thirds of his force), 450 tanks, and 1,000 guns—against the 13,500 casualties (less than 8 per cent) suffered by Montgomery.

By Nov. 12 the 8th army had driven the enemy beyond the Egyptian frontier, and was well away on its great pursuit, which was to carry it over 1,400 miles of desert in the 2½ months to come. Four days earlier, on Nov. 8, U.S. troops had landed at Casablanca. Consult The African Campaign, 10th Aug., 1942, to 13th May, 1943, Alexander's dispatch, H.M.S.O. 38196, 1948.



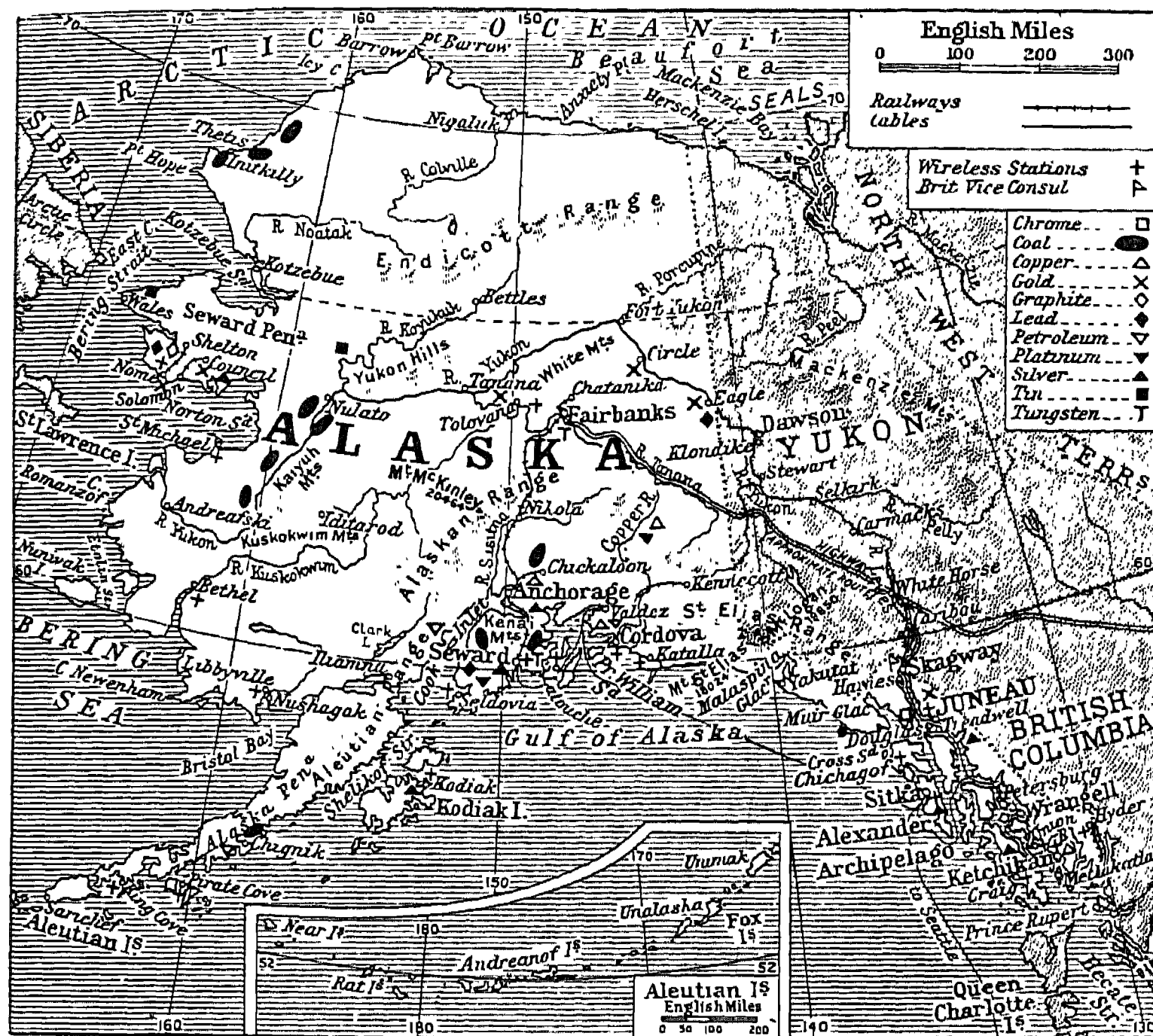
in this belt. The N. and central region is a vast plateau, with low tundras or treeless steppes extending inland for many miles, broken at intervals by mts. and dotted with innumerable lakes and swamps. The Yukon river, navigable for upwards of 1,850 m., with its tributaries, forms one of

Canada and the U.S.A. The Richardson Highway runs from Valdez to Fairbanks (371 m.), and other roads link up with Matanuska, and with the Yukon river at Circle. There is steamer transport on the Yukon and Tanana rivers. Airways are extensively used; for example, Nome, in the

communities have grown up in the Matanuska valley and in the region of Fairbanks, though in 1939 only about 7,000 acres were harvested. Most of the hardy grains and vegetables can be grown S. of the Arctic Circle, and dairy and poultry farming have been developed to a considerable extent.

Coal-mining is an increasing industry, chiefly at Eska Creek. Copper is mined near the Copper river, Prince William Sound, and in the Ketchikan district. Gold is mined in several areas, notably in the Yukon region and at several places on the W. coast; the chief development of quartz-mining is at Juneau, while centres of lode mining are Fairbanks and Tolovana in the Yukon valley, Seward, Circle, and Tolstoi. Graphite is obtained in the Seward Peninsula. Platinum is mined in the Seward and Copper river districts and tungsten near Seward and Fairbanks.

Other deposits awaiting full development are chromium, antimony and tin. There is a large petroleum reserve in the N.



Alaska. The north-west extremity of the North American continent, where it is divided from Asia by Bering Strait. It was bought by the United States from Russia in 1867

the important drainage systems of the world; about 1,600 m. of its course pass through Alaska. The climate has a wide range; under the influence of the ocean the S. portion of the coast has a mild temperature, while in the interior the frosts of winter are said to penetrate 30 yds. below the surface. The rainfall is plentiful; at Sitka the mean annual fall registers more than 80 ins., and on some parts of the coast and in the islands as many as 110 ins. are recorded. In the interior and the N. the fall is inconsiderable.

**COMMUNICATIONS.** The Alaska Railroad, completed in 1923, runs from the port of Seward as far as Chatanika, 50 m. N.E. of Fairbanks. The Alaska Highway (v.i.), constructed in 1942 as a war measure to facilitate the supply of U.S. forces in the Aleutian Islands, brought Alaska into direct road communication with

Seward peninsula, is connected with Fairbanks by a daily air service. Another regular service links Fairbanks with Seattle, Washington.

**INDUSTRIES.** The fur-bearing animals, moose, fox, beaver, and mink, are decreasing, but fur-seals and otters are caught in numbers limited by official regulations. Mt. McKinley National Park (over 3,000 sq. m.) was established in 1917 primarily to preserve the wild game. More important is the huge catch of salmon, which provides the basis for the large canning industry. In 1939 the fishing and canning industries provided employment for about one-third of the total population. Cod, herring, and halibut are also caught in abundance. The national forests cover a surface of more than 20 million acres, and yield white spruce and excellent yellow cedar. Farming

#### POPULATION, GOVERNMENT, ETC.

The natives are of two stocks: the Eskimo, or Innuits, and the Indian. The Aleuts, a branch of the Innuits, inhabit the Alaskan peninsula and the Aleutian Islands, and the Eskimos are found on the N. and W. coasts. Indian tribes occupy the interior and the S.E. The revenue of Alaska is gained by the issue of licences to trade in various articles; there is scarcely any other taxation. There are ample educational facilities, the University of Alaska, near Fairbanks, being maintained partly by Federal funds. The territory has its own legislative assembly of 16 senators and 24 representatives, which meets biennially at Juneau. There is a governor, appointed by the president of the U.S.A., who holds office for four years, and a delegate to Congress, elected every two years, though without power to vote. The principal

**Alastor.** In Greek mythology, name applied to avenging deities who pursued sinners and incited them to commit fresh crimes. It is an epithet of Zeus and the Furies.

**Ala-tau.** District of Kazakh S.S.R., and name of several mt. ranges on the borders of Kazakh S.S.R., Kirghiz S.S.R., and Sinkiang. They form part of the Tian-shan system, N. and S. of the Ili, and their greatest height is nearly 15,000 ft. The Terskei Ala-tau runs S. of Lake Issyk-kul, in Kirghiz S.S.R.; the Kunghei and Trans-Ili Mts. stretch E. and W. on the N. side of the lake; and the Zungarian range, farther N., trends E. to W.

**Alava.** Southernmost and largest of the Basque provs. of Spain. Watered by the Zadorra, a tributary of the Ebro, it is largely mountainous, produces iron, copper, lead, marble, and timber, and contains several mineral springs. Cattle and sheep are reared, and maize, hemp, flax, and fruit grown. Vitoria is the capital. Area 1,175 sq. m. Pop. (1950) 118,012.

**Alb** (Lat. *albus*, white). Eccles. vestment of white linen, with openings at the neck and foot. It has tight sleeves, and reaches to the feet, being gathered at the waist by a girdle. In the Roman Catholic Church it is always worn under other eucharistic vestments by bishops, priests and deacons at Mass and frequently by acolytes, and it is often ornamented with pieces of embroidery called apparels. Its use in the Church of England, abandoned under Elizabeth I, was revived partially in the 19th century. See Vestments.



Alb, decorated with apparels

**Alba.** Town of Italy, in Cuneo province. It is situated on the Tanaro, 42 m. by rly. S.E. of Turin. Its Gothic cathedral of S. Lorenzo was rebuilt after 1486, and it has a museum of local antiquities. Its chief trade is in wine, and silkworms are reared locally. It is on the site of Alba Pompeia, founded about 100 B.C. Pop. (1951) 17,449.

**Alba, JACOBO MARIA DEL PILAR CARLOS MANUEL,** 17th DUKE OF; FITZ-JAMES STUART, BERWICK. 10th DUKE OF (1878-1953). Spanish diplomat. Born Oct. 17, 1878, and educated at Beaumont, he was Spanish minister of education.

1930, and foreign minister, 1930-31. A staunch monarchist, he continued to support the royalist party after the abdication of Alphonso XIII, but compromised with the Franco regime, and was Spanish ambassador to Great Britain, 1939-45. He resigned when the claimant to the Spanish throne, Don Juan, expressed disapproval of Franco's regime. He died Sept. 24, 1953.

**Albacete.** Prov. of S.E. Spain, formed of parts of New Castile and Murcia. Hilly and mountainous, with wide plains and fertile valleys, it is watered by the Júcar and Segura. Fruit is grown, stock rearing is a great industry, bees and silkworms are reared, and cutlery and wine made. Area, 5,737 sq. m. Pop. (1950) 397,100.

**Albacete.** City of Spain. Capital of Albacete province, 140 m. by rly. S.E. of Madrid, it is a large cattle-market, and is famed for its knives and daggers. Pop. (1950) 71,822.

**Albacore.** Fish belonging to the same sub order as the mackerel and tunnies. One species is called the long-finned tunny (*Germo alalunga*). This fish, often about 3 ft. in length, is particularly common in the spawning season off the S. coast of California, but is also found in the Mediterranean and other temperate or tropical seas.

**Alba Julia.** Town of Transylvania, Rumania, formerly known as Karlsburg. It is situated on the Maros, 48 m. S. of Cluj (Kolozsvár). An historic town, it was the Roman Apulum, and later the capital of Transylvania. Pop. (1948) 14,420.

**Alba Longa.** First of Latin cities and mother city of Rome. Presumably it was situated on a ridge above the Alban Lake, 15 m. S.E. of Rome. Legend ascribes its foundation to Ascanius, son of Aeneas, some 300 years before the foundation of Rome. See Rome.

**Alban.** British saint and martyr. According to tradition he was born in the 3rd century at Verulamium, now known as St. Albans, and was converted A.D. 304 by a fugitive Christian priest whom he sheltered. Martyrdom quickly followed. A later version of the legend makes him a Roman soldier converted in Rome. His veneration in England dates from the 5th century, and the abbey of St. Albans was founded on the site of his martyrdom in 793. June 22 is S. Alban's festival, but the Church of England Calendar, in which it was placed in 1662, marks it June 17. See St. Albans.

**Albanesi, MADAME.** Pen-name of Effie Henderson (d. 1936), British novelist, who married Chevalier Carlo Albanesi (d. 1926), a professor of music. She gained popularity early and maintained a prolific output, some of her best-known titles being *Peter, a Parasite*, 1901; *Capricious Caroline*, 1904; *The Brown Eyes of Mary*, 1905; *Beloved Enemy*, 1913; *When Michael Comes to Town*, 1917; *The Green Country*, 1927. She died Oct. 16, 1936.

Her elder daughter, Meggie Albanesi, who died in 1923 at the age of 24, had already won distinction as an actress in emotional parts created by her in, e.g., *A Bill of Divorcement* and *East of Suez*. A memoir by her mother was published in 1928.

**Alban Hills** (Ital. Colli Albani). Group of mountains in Italy about 15 m. S. of Rome. Fourteen towns and villages are situated among the hills: they are called the *castelli Romani* (Roman castles); the largest is Velletri. The economy of the Alban Hills is based on Rome. The townships of Rocca di Papa, Frascati, Albano, Nemi, and Castel Gandolfo (where the pope has a summer residence), and the lakes of Albano and Nemi, are favourite week-end and holiday resorts of the Romans. The Alban Hills supply not only the wine for Rome, but, being rich in natural springs, a great part of its water, brought to the capital today, as in ancient times, by aqueducts running along the Via Appia.

During the Second Great War the Germans established a strong defensive line in the Alban Hills, with Frascati as their chief garrison town, in an attempt to protect Rome from the Allied advance in 1944. The Allied 5th army had to fight hard during May and early June to drive the Germans from their positions.

**Albani.** Roman family, said to have come from Albania in the 16th century. Several members attained high ecclesiastical rank. Giovanni Francesco became pope in 1700 as Clement XI. His nephew Alessandro (1692-1779) was made a cardinal in 1721. A bitter opponent of the Stuarts, he used his influence with Pope Clement XIII to thwart Cardinal York's attempts to get his brother, Charles Edward Stuart, recognized by the pope as king of Great Britain. He built the Villa Albani, near Rome, where he formed a famous collection of antiquities, chiefly sculpture. Many of these were removed by Napoleon and





Albania. 1. Peasants returning from the market in Shkodër. In the foreground is a veiled Muslim woman. 2. Derricks dotting an oilfield near Berat, a southern town. 3. New quarter of Tiranë, the capital and largest town. 4. Shops in the main street of Elbasan, linked with the port of Durrës by the first railway constructed in Albania

Albania's foreign trade was with Italy; after the Second, it was in the main with the other Soviet bloc countries. The chief ports are Durrës and Vlonë.

The motorroads laid down under the Italian occupation have been extended to create a network of good roads throughout the country; but transport in the more remote mountain areas remains dependent on mules and oxen. The first railway was built in 1947, connecting the port of Durrës with Kavajë and Peqin, and later extended to Elbasan. Another line links Durrës with Tiranë.

In religion the Albanians are Muslims as to seven-tenths (est. 688,300); Orthodox Christians, belonging to the Autocephalous Orthodox Church of Albania, one-fifth (est. 221,200), and concentrated mainly in the Gjinokastër and Korrrë regions; and Roman Catholics, one-tenth (est. 104,200), located chiefly in the north.

#### Albanians an Ancient People

The Albanians are a homogeneous people, the sole surviving remnant of the original Illyrian and Epirot peoples inhabiting the Balkan Peninsula in pre-Hellenic times. The only considerable

minority are the Greeks and Greek-speaking people in Korrrë and Gjinokastër districts.

The Albanian language, unique survivor of the original pre-Hellenic speech of the peninsula, is heavily adulterated with Slav, Greek, and Turkish words. It has no written literature, and an alphabet, with Latin characters, was adopted only in 1909.

#### Form of Government

Albania was declared a people's republic on Jan. 11, 1946. A new constitution was set up in 1948, and amended in 1950. The supreme legislative authority is the people's assembly, elected every four years by all Albanians over 18. The assembly elects the presidium, consisting of one chairman (or premier), three deputy-chairmen, a secretary, and ten members. The Albanian party of labour, headed by Enver Hoxha, the only legal party in the country, seized power at the end of the Second Great War.

Nine of the ten administrative units, or prefectures, take their names from the towns of Berat, Durrës, Gjinokastër, Korrrë, Elbasan, Kukës, Shkodër, Vlonë, Tiranë. The capital of Diber is

Peshkopi (the town of Diber, Debar, or Dibra being in Yugoslavia). Each prefecture has a council, elected every three years.

Justice is administered by the supreme court, elected by the people's assembly every four years. There are also subsidiary people's courts and military tribunals. The judges are elected by popular vote, and can be recalled. A new penal code, modelled on Soviet law, was set up in 1952.

**HISTORY.** Considered by the ancient Greeks as part of the barbaric masses beyond their frontiers, the Albanians have no known history up to the end of the Hellenic era. The Romans completed the occupation of the country under Augustus (c. A.D. 200) and built the great Via Egnatia from Durrës to the Danube, roughly following the line of the Shkumbi river. With the break-up of the Roman Empire, Albania came under Byzantium, and for the next thousand years the history of Albania is a confusing succession of invasions and occupations. Goths, Byzantines, Bulgarians, Serbians, Normans and Angevins, and Venetians in turn occupied either the whole or parts of the country. The Turkish con-

the city hall, the state hall, state museum, and many colleges and schools. There are also many fine examples of Dutch colonial building. Formerly a Dutch settlement, ceded to Great Britain in 1664, Albany was named after the duke of York and Albany, afterwards James II. It was granted a charter in 1686, and in 1754 the first provincial congress met here to arrange the union of the colonies. It became the state capital 1797. Pop. (1950) 298,111.

**Albany, CONVENTION OF.** Assembly of representatives from seven of the American colonies—Massachusetts, Connecticut, New Hampshire, Rhode Island, Pennsylvania, Maryland, and New York. In 1754 war between Great Britain and France was imminent, and the promoters of the conference desired a closer union between the colonies and the strengthening of their alliance with the Indians of the Five Nations. It was arranged with the Indians that they should take part in the war, and Franklin proposed a plan for a union of the colonies under a president-general, appointed by the English king, and a council of representatives. The convention approved the plan, but it was rejected by both the authorities in London and the colonists themselves. See *Rise of the Republic*, R. Frothingham, 1872.

**Albany, COUNT OF.** Title successively assumed by two brothers who claimed descent from Charles Edward Stuart, the Young Pretender. According to their own account this was through a son, born in 1773, of Louisa, countess of Albany. The elder, John Sobieski Stolberg Stuart (1797–1872), and the younger, Charles Edward Stuart (1799–1880), styled themselves variously Allan, Stuart Allan, Allan Stuart, Hay Allan, Hay Allan Stuart, Stuart Hay Allan. Their real name was Allen, their father being Thomas Allen, a naval officer. They fought for Napoleon at Dres-

den and Leipzig and perhaps at Waterloo. Their writings include *Tales of the Century*, *Vestiarium Scoticum*, a work on clan tartans, and *Lays of the Deer Forest*. They were buried at Eskdale, near the shooting-box on Eilean Aigas built for them by Lord Lovat.

**Albany, DUKE OF.** Scottish title. The first duke was Robert, a brother of Robert III, king of Scotland, who was given the title in 1398. Some years later it became extinct, but was revived about 1450 for Alexander, a younger son of James II. In 1536 it again became extinct, when John Stewart, the 2nd duke, died. John was regent of Scotland during the minority of James V, and was a friend of Francis I of France. Lord Darnley, the husband of Mary Queen of Scots, was created duke of Albany in 1565, and from him the title passed to James I and the succeeding Stuart kings, and was claimed by the exiled descendants of James II. Ernest Augustus, a brother of George I, and Edward Augustus, a brother of George III, were in turn created duke of Albany, and both died without heirs, as also did the next duke, Frederick, a son of George III. In 1881 this ancient title was revived and bestowed by Queen Victoria on her youngest son, Prince Leopold.

**Albany, LEOPOLD, DUKE OF** (1853–84). Youngest son of Queen Victoria. He was born at Buckingham Palace, April 7, 1853, and studied at Oxford in 1872–6. Made a privy councillor in 1874, in 1881 he was created duke of Albany. In 1882 he married Helen Frederica Augusta, princess of Waldeck-Pyrmont, by whom he left a son and a daughter. He died at Cannes, March 28, 1884.



Prince Leopold,  
Duke of Albany  
*Downey*

His daughter Alice Mary was married in 1904 to Prince Alexander of Teck, afterwards earl of Athlone. His son, Leopold Charles, succeeded his uncle as duke of Saxe-Coburg in 1900, when he renounced his British nationality. During the First Great War, as a German prince he fought against Britain, and was deprived of his British titles in 1919.

**Albany, LOUISA, COUNTESS OF** (1752–1824). Wife of Charles Edward Stuart, the Young Pretender. Louisa was the eldest daughter of Prince Gustavus Adolphus of

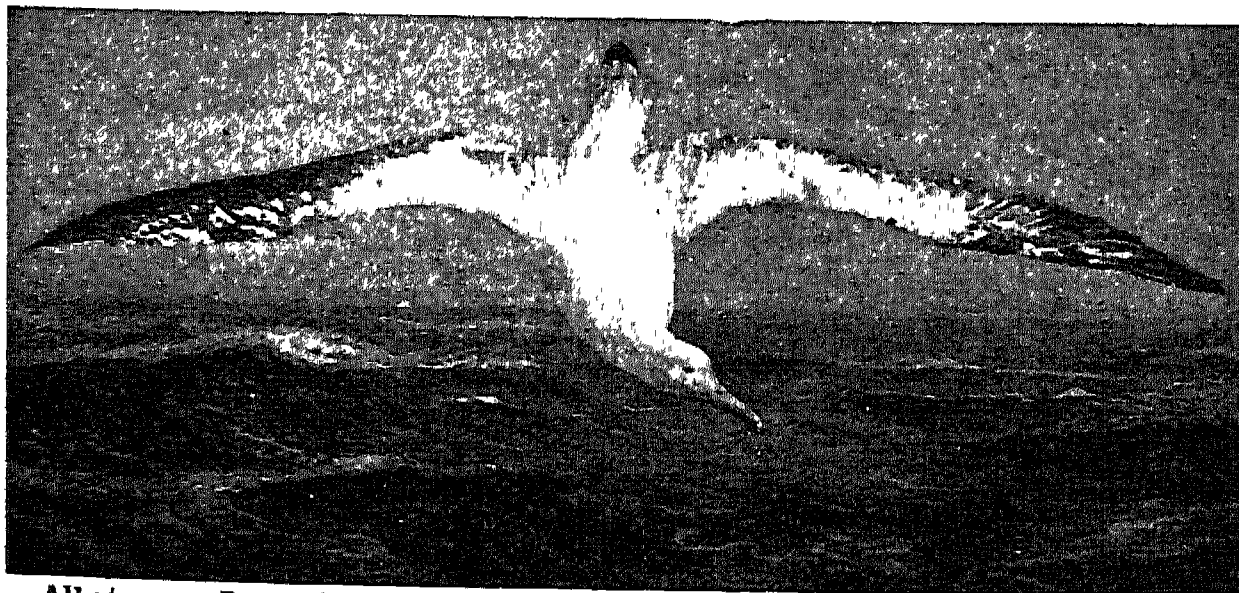


Louisa, Countess  
of Albany  
*Nat. Port. Gallery*

Stohlberg-Gedern, and was born at Mons, Sept. 20, 1752. In 1772 she married Charles Edward Stuart, who styled himself count of Albany, but the union was childless and unhappy, and in 1780 she fled for protection to her brother-in-law, Cardinal York. In 1784 she was separated from her husband, who died four years later. After traveling with the Italian poet Alfieri she settled at Florence, where she died Jan. 29, 1824. Among her friends she numbered the French painter François Xavier Fabre of Montpellier, to whom she bequeathed all her property. *Consult* The Last Stuart Queen, H. M. Vaughan, 1910; Louise of Albany, G. R. Preedy, 1945.

**Albany, THE.** Building on the N. side of Piccadilly, near Burlington House. Erected on the site of Sunderland House, it was known as Piccadilly House until 1770, when Lord Holland sold it to Viscount Melbourne, by whom its name was changed to Melbourne House. He exchanged it for a mansion in Whitehall with the duke of York and Albany, after whom it was renamed and let out first as bachelors' chambers and more recently in flats. Byron, Lytton, and Macaulay are among the distinguished men who have resided there at one time or another. From about 1900 some of the freeholders, deciding that "The Albany" sounded like a public house, called it simply Albany.

**Albatross.** Name given to the genus *Diomedea* of the zoological order Tubinares, or tube-nosed birds, which includes the petrels. All birds of this order have the nostrils produced into tubes, which lie on the upper surface of the beak. Albatrosses are the largest marine



Albatross. Largest of the sea birds, and remarkable for the speed with which it can fly and for the long period during which it can keep on the wing



His son Christopher, who succeeded to the dukedom, was known previously as earl of Torrington. In 1675 he was made lord-lieutenant of Devonshire and he succeeded Monmouth in command of the Horse Guards, being active in raising men to serve against that invader in 1685. He was chancellor of the university of Cambridge, and was governor of Jamaica when he died in 1688.

*Bibliography.* Lives: T. Gumble, 1671; Julian S. Corbett, 1889; O. Warner, 1936; Honest George Monck, J. D. G. Davies, 1936; Christopher Monck, 2nd Duke of Albemarle, E. F. Ward, 1915.

**Albemarle Sound.** Shallow inlet on the N.E. coast of North Carolina, U.S.A. About 60 m. long, with a breadth of from 4 m. to 16 m., it is generally unnavigable except where dredged.

**Albemarle Street.** London thoroughfare running N. from Piccadilly to Grafton Street. It owes its name to George Monk, 1st duke of Albemarle, who had a residence here, Clarendon House, demolished about 1683. The street contains shops and clubs, but its most interesting buildings are No. 50, the publishing house of John Murray, famous for its associations with Lord Byron; the house of the Royal Asiatic Society; and that of the Royal Institution.

**Albendorf.** Village of Silesia. On the Cedron, 50 m. S.S.W. of Breslau (Wroclaw), it was famous as a place of pilgrimage from 1200. It has a beautiful 18th century church on the model of the temple at Jerusalem, a Calvary, and an image of the Virgin. Before the First Great War this place, with fewer than 2,000 inhabitants, was visited yearly by about 100,000 pilgrims. It is in the part of Germany placed under Polish administration in 1945.

**Albenga.** Town and seaport of Italy, in the prov. of Savona. The seat of a bishop, it is on the Gulf of Genoa, 52 m. by rly. S.W. of Genoa. On the site of the ancient Albingaunum, chief town of the Ligurian tribe of the Ingauni, it was rebuilt in 354. With a Gothic cathedral, ruins of the medieval Carretto Palace, and with Roman remains in the vicinity, it is perhaps the most picturesque town on the Riviera. Pop. (1951) 14,617.

**Alberche.** River of Central Spain. Rising N. of the Sierra de Gredos, it flows about 150 m. E. and S.W. to the Tagus near Talavera.

**Alberni.** Town and port of Vancouver Island, Canada. It stands at the head of the Alberni

Canal, 58 m. W.N.W. of Nanaimo, and is the terminus of branches of the C.P.R. and the C.N.R. to Victoria. From here steamers go to Victoria and elsewhere. Its industries are connected with lumbering, sawmills, and fish curing. Pop. (1951) 3,323.

**Alberoni, GIULIO** (1664-1752). Italian prelate and Spanish statesman. Born at Firenzuola, near Piacenza, of humble parents, he



*Giulio Alberoni*

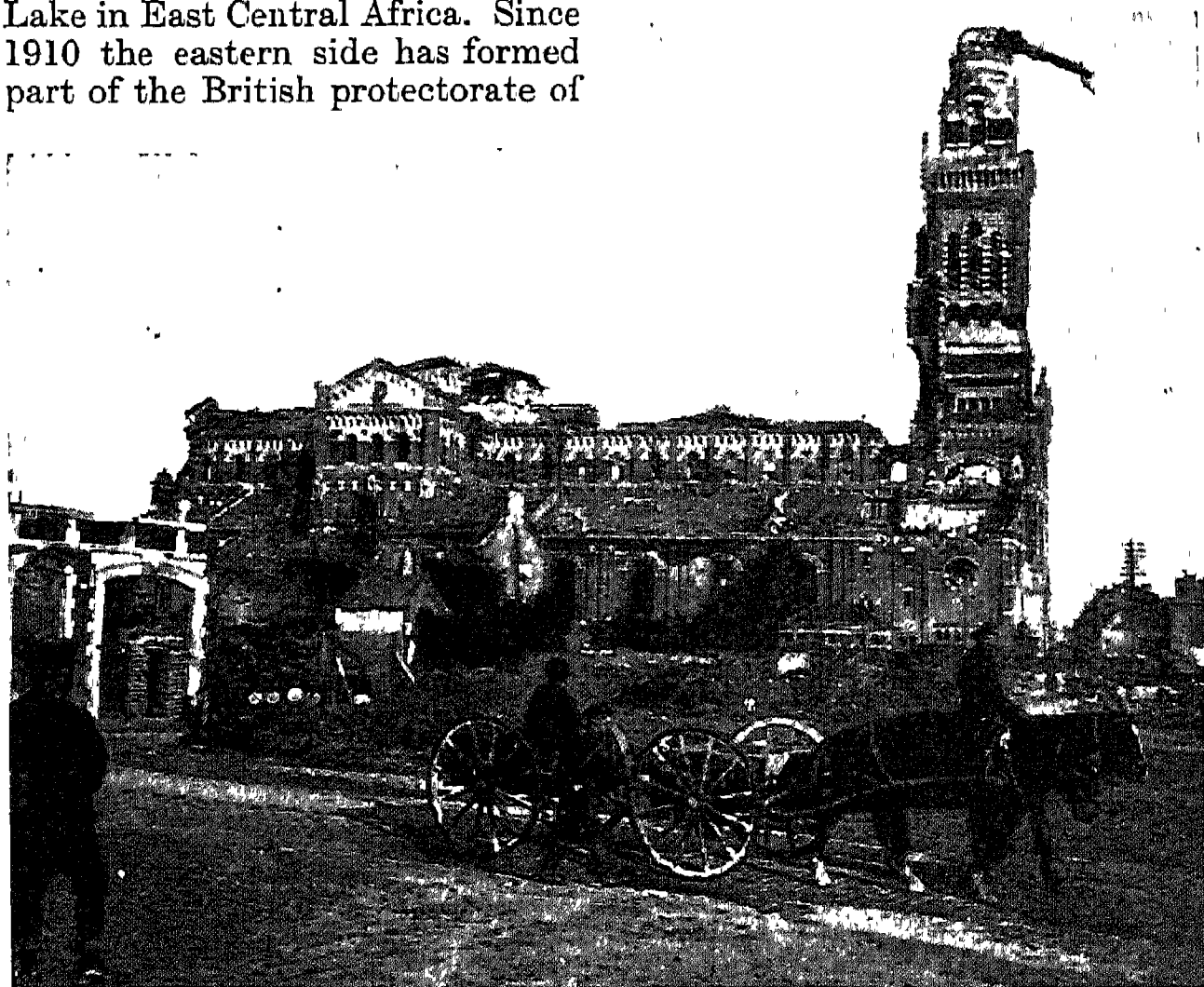
was ordained and became secretary to the duke of Vendôme. After varied diplomatic experiences he was in 1713 sent by the duke of Parma to Madrid. He negotiated the marriage of Philip V with Elizabeth Farnese in 1714, and in the same year became prime minister, being made a cardinal in 1717. He did much to revive Spanish commerce and to organize the Spanish army and navy, but found little favour with the nobles. His aggressive foreign policy resulted in 1719 in the Quadruple Alliance between England, France, Austria, and Holland, and his banishment from Spain. He died at Piacenza, June 16, 1752.

**Albert.** River of N. Queensland. It is formed by the junction of the Nicholson and Gregory rivers and flows past Burke Town to the Gulf of Carpentaria.

**Albert** OR ALBERT NYANZA. Lake in East Central Africa. Since 1910 the eastern side has formed part of the British protectorate of

Uganda, the western side being attached to the Belgian Congo. It is about 80 m. N.W. of the Victoria Nyanza. It is 100 m. long and 25 m. broad, has an area of 1,650 sq. m., and is situated 2,028 ft. above sea level, but 1,000 ft. below the general level of the surrounding country. The Victoria Nile empties into the N.E. corner and the White Nile issues from its N. extremity. At its S.W. end it receives the Semliki, the outlet of Lake Edward. The Albert Nyanza is shallow, the average depth being 30 to 40 ft., and is likely to become more so through the heavy alluvial deposits of the two tributary rivers. The situation of the lake was first announced by Speke and Grant in 1862, but it was first visited by Samuel Baker in 1864. Steamers link Butiaba (Uganda) with Kasengi and Mahagi Port (Belgian Congo).

**Albert.** Town of France, in the department of Somme. It stands on the river Ancres, 18 m. N.E. of Amiens and 11 m. S.W. of Bapaume. Formerly known as Ancres, it received its present name on its presentation to Charles d'Albert, duke of Luynes, by Louis XIII. The church of Notre Dame de Brebières became famous during the First Great War for its so-called hanging Virgin, a gilded figure of the Madonna and Child, which fell into a position 15 degrees below the horizontal during the early operations and remained thus until March, 1918, when it fell. In Oct., 1914, the German lines were drawn 2 m. E. of the town.



Albert. The cathedral as damaged early in the First Great War, showing the hanging statue of the Virgin. It was later restored

of the U.S.A. at a time of tension between the two countries. His suggestions were adopted, and it is more than possible that they averted a war.

Albert was deeply mourned by Queen Victoria for the rest of her long life. He is publicly commemorated in London by the Albert Memorial in Kensington Gardens and by the adjacent Royal Albert Hall. *Consult* Life, Sir Theodore Martin, 5 vols., 1875-80; Letters of Queen Victoria, 1837-61, ed. A. C. Benson and Viscount Esher, 3 vols., 1907; The Prince Consort (Letters 1831-61), ed. K. Jagow, trans E. T. S. Dugdale, 1938; The Prince Consort R. Fulford, 1949. The prince is also treated in considerable detail and with some sympathy in Queen Victoria, Lytton Strachey, 1921.

**Albert (1875-1934).** King of the Belgians. Born at Brussels, April 8, 1875, he was the second son of Philip, count of Flanders, a younger brother of Leopold II of the Belgians. Albert was educated for the throne, his travels including visits to the U.S.A. and the Congo Free State.



Albert,  
King of the Belgians

On his father's death in 1905 he became count of Flanders; and when Leopold II died, Dec. 17, 1909, Albert succeeded him as king.

In Aug., 1914, when presented by Germany with the demand for free passage of German troops, he rejected the ultimatum. Belgium was at once invaded and quickly overrun. The king bore misfortune with a dignity that won for him the respect of Europe. Both his sons were sent to England to be educated, the government moved to Le Havre, and he himself took command of his army in the field. In Sept., 1918, he commanded the Allied army—containing Belgian, British, and French troops—which recaptured the Belgian coast by Oct. 20.

After the Allied victory Albert re-entered Brussels in triumph, Nov. 22, 1918. Thereafter he devoted himself with energy and sympathy to the rebuilding of his country's economic and social life. Among his particular interests were aeronautics and mountaineering; the second led to his death, for while climbing a crag in the

Ardennes, Feb. 17, 1934, he slipped and was fatally injured.

Albert married in 1900 Elisabeth (b. 1876), daughter of Duke Charles Theodore of Bavaria. They had three children, Leopold (b. 1901), who succeeded Albert as Leopold III (*q.v.*); Charles (b. 1903); and Marie José (b. 1906; m. 1930 the crown prince of Italy, afterwards Humbert II).

**Albert (1414-86).** Elector of Brandenburg, who was surnamed Achilles. The third son of the elector Frederick I of Hohenzollern, in 1440 he succeeded to the principality of Ansbach, in 1464 became prince of Bayreuth by the death of his brother John, and in 1470 elector of Brandenburg by the abdication of his brother Frederick II. Two years later he added Pomerania to his dominions. A powerful warrior and ruler, by his issue of the so-called Dispositio Achillea in 1473 he established primogeniture for the mark of Brandenburg. He died at Frankfurt-on-Oder, March 11, 1486.

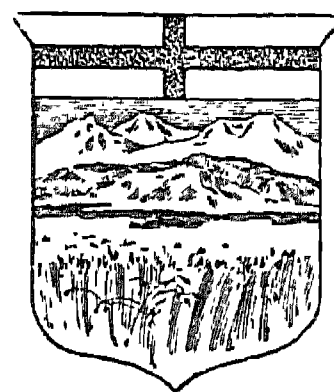
**Albert (1522-57).** Margrave of Brandenburg-Kulmbach. Belonging to the Hohenzollern family, and surnamed Alcibiades, he was born at Ansbach, March 28, 1522. After fighting for Charles V, he joined Maurice of Saxony against Charles, but later returned to the emperor's service. In July, 1553, he was defeated by Maurice at Sievershausen, and in Dec., 1553, was placed under the imperial ban and fled to France. He died at Pforzheim, Jan. 8, 1557.

**Albert (1490-1545).** German prelate. The younger son of John Cicero, elector of Brandenburg, he was made archbishop of Magdeburg in 1513. In 1514 he secured the archbishopric of Mainz, one of the seven electorates of the empire, and in 1518 was made a cardinal.

**Albert (1490-1568).** Duke of Prussia. The third son of Frederick of Hohenzollern he was elected grand master of the Teutonic order in 1511. Having failed in his attempt to relieve the order from the suzerainty of Poland, he turned Lutheran, secularised Prussia, and in 1525 had it converted into a duchy hereditary in his family and still subject to Poland. This cost him his grand-mastership, but was important for the development of the Prussian monarchy. In 1544 he founded the university of Königsberg. He died at Tapiau, March 20, 1568.

**Alberta.** Province of Canada, in the middle west. Originally one of the four districts of the North-West Territory, it received

its present status in 1905, including about half the former district of Athabaska and small portions of Assiniboia and Saskatchewan.



Alberta. Arms of  
the province

It is bounded N. by the Mackenzie, E. by Saskatchewan, S. by the 49th northern parallel beyond which lies the U.S. state of Montana, and W. by the Rocky Mts. and British Columbia. The length from N. to S. is 760 m., the mean breadth from E. to W. 255 m., and the area 255,285 sq. m.

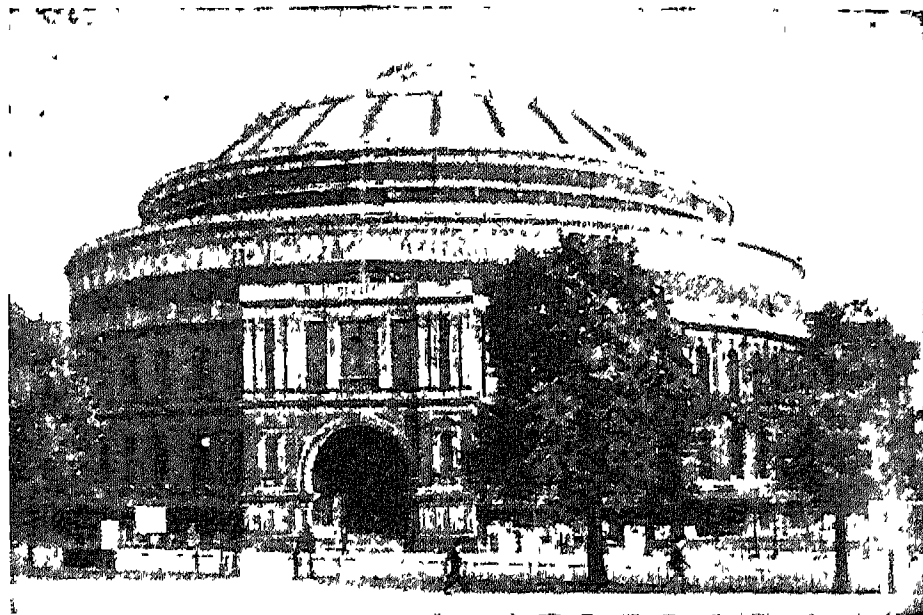
Three large river systems, the Saskatchewan, Athabaska, and Peace, with their tributaries, traverse the plains. The lakes, though covering 6,485 sq. m., are insignificant apart from Athabaska and Lesser Slave. The climate, influenced by warm chinook winds from the Pacific, exhibits great seasonal variation, for summer temperatures exceed 90° F. in the S.E. and winter temperatures range from 40° F. above to 30° F. below zero. Rainfall is scanty except in the centre, and irrigation has been necessary in the S., much of which is treeless prairie. N. of this is a region of grassland with poplar woods, and farther N. again are larch, spruce, and cottonwood, the area under forest being 159,000 sq. m. The national parks include 8,000 sq. m. of forest, Jasper national park being the biggest in the world.

In the 19th century Alberta consisted of a vast ranching country. Arable agriculture developed later, with wheat and oats the chief crops; but Alberta remained the leading prov. of Canada for cattle and beef. More than half the 1951 pop. of 939,501 was living on the land. Four-fifths of the non-forested land is classified as suitable for agriculture; but in 1950 less than a third of this area was under cultivation.

Alberta's coal reserves total 87 per cent of those of Canada and 14 per cent of the world's. The prov. is one of the richest petroleum areas in the world; proved reserves amount to 357 million metric tons, and production increased rapidly after completion of pipelines from Edmonton, to Superior in 1951, to Vancouver port in 1953. Another pipe-line carries natural gas to Toronto and Montreal. At Waterways are rich salt deposits. The prov. has 5,805 m. of



the hall measures 219 ft. by 185 ft., while the distance from the floor to the central roof is 136 ft. The centre floor-space, or arena, is reached by six staircases, and is 102 ft. long by 68 ft. The hall is chiefly used for concerts, displays, and public meetings, and its organ is one of the largest in the world.



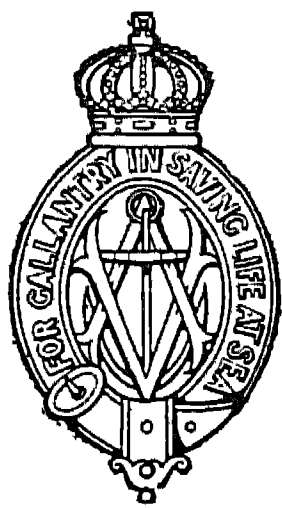
Albert Hall, London, completed in 1871, from the design of Captain Fowke, R.E., and Sir Gilbert Scott

The acoustics were long marred by a persistent echo; but considerable improvements were made in this respect when the destruction of Queen's Hall in an air raid in 1941 left the Albert Hall the only large concert hall in London. The Albert Hall itself suffered minor damage from bomb blast in Feb., 1944. In 1949, in a further attempt to improve the acoustics, the original glass roof was replaced by an aluminium one.

**Alberti**, CHERUBINO OR BORGHEGGIANO (1553-1615). Italian engraver, born at Borgo San Sepolcro, in Tuscany. His fame rests upon his nearly 180 line engravings. Several fine friezes by Caravaggio are known only through Alberti's prints.

**Alberti**, LEONE BATTISTA DEGLI (1404-72). Italian scholar and artist. Born at Genoa, Feb. 18, 1404, he was the illegitimate son of a Florentine. In 1432 he entered the service of Pope Eugenius IV, and remained in that of five of his successors, at Florence or at Rome, until his death in April, 1472. A leading figure in the artistic and intellectual circle of his time, he was famed also as a musician and architect. His writings include *De Re Aedificatoria*, 1485, the first large printed book on architecture, and a treatise on painting.

**Albert Medal**. British decoration for gallantry. It was instituted by Queen Victoria in 1866 for distinguished acts of bravery in life-saving at sea; in 1877 its award was extended to similar acts on land. The medal was originally in two classes: 1st class in gold, 2nd class in bronze. Both were oval and carried the monogram V.A., with



Albert Medal  
Courtesy of  
Geo. Philip & Sons

an anchor interlaced for awards won at sea. The ribbon is crimson and white. In 1951 the Albert Medal 1st class was replaced by the George Cross, and the Albert Medal 2nd class was replaced, except for posthumous awards, by the George Medal.

**Albert Memorial**. Elaborate canopied monument, erected in Kensington Gardens, London, in memory of Albert, Prince Consort. Finished in 1872 and unveiled March 9, 1876, it is 175 ft. high, the gilded statue of the prince being by J. H. Foley. The whole, which is richly embellished with mosaics and carvings in high relief representing painters, sculptors, and musicians, was designed by Sir Gilbert Scott.

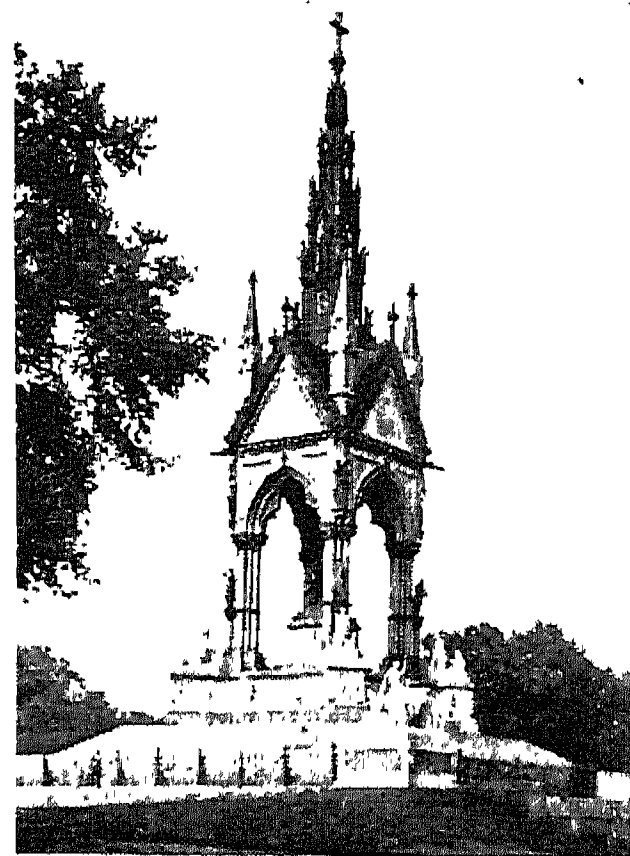
**Albertus Magnus** (c. 1206-80). Scientist, philosopher, theologian, and saint, born at Lauingen, in Swabia. He studied at Padua, joined the Dominican order of friars in 1223, taught theology at Hildesheim, Ratisbon, Paris, and Cologne, 1248-54, where Thomas Aquinas was his pupil. In 1254 he was elected provincial of the Dominicans in Germany. In 1260 he was made bishop of Ratisbon, but resigned two years later and returned to his studies at Cologne. He took part in the Council of Lyons, 1274. Beatified by Pope Gregory XV in 1622, he was canonised by Pius XI in 1931; his festival is kept on Nov. 15.

Albertus Magnus was, with the possible exception of Roger Bacon, the greatest scientist, philosopher, and theologian of his time. Hence the title universal doctor bestowed upon him. In the development of physical geography, botany, astronomy, and mineralogy: in calling attention to the importance of Aristotle's teaching; and in shaping the form of Christian philosophy and theology he exercised a lasting influence. His works, 21 folio vols., were published

in 1651 at Lyons and in Paris, 1899-1900.

**Albertville**. Settlement in the Belgian Congo, on the W. shore of Lake Tanganyika. It is the terminus of a rly. from Kindu on the Upper Congo (Lualaba).

**Albi**. City of France, capital of Tarn department. It is on the Tarn river, which here runs through a small canyon, and lies 44 m. by rly. N.E. of Toulouse. From the 5th century on, it was conquered in turn by Visigoths, Saracens, kings of France, and counts of Toulouse. In the 12th century bishops substituted their authority for that of the reigning powers. A Church council held here in 1254 condemned the Catharian heresy (see Albigenses). The remarkable cathedral of Sainte Cécile, begun in 1282, was completed during the following two centuries. Its beautiful interior frescoes and flamboyant rood-screen are in strong contrast with the severe red-brick exterior.



Albert Memorial, Kensington Gardens, London, designed by Sir Gilbert Scott

during the Middle Ages the façade was part of the ramparts of the city. Sainte Salvy church has beautiful cloisters. The Palais de la Berbie, overlooking the Tarn, formerly the archbishop's palace is a museum; it has a fine collection of Toulouse-Lautrec's work. Albi trades in artificial silk, felt hoods and fezzes for Arabs, clogs, ceramics, glass, and metal furniture. It has tan yards, iron and aluminium smelting works, mechanical engineering works, coal mines, an aerodrome and a flying school. Pop. (1954) 34,693.

**Albigenses**. Name given to a religious sect which flourished in the S. of France in the 11th-13th centuries. Derived from the town

appreciation of Canova's work helped very considerably to win recognition for his genius.

**Albrun Pass.** Alpine route between Switzerland and Italy. It leads up the Binn valley, in the canton of Valais, down the Devero glen, to Baceno, N. of Domodossola. It rises to 7,907 ft.

**Albuera, BATTLE OF.** British victory in the Peninsular War. It was fought on May 16, 1811. The French, about 23,000 strong, under Marshal Soult, were marching to relieve Badajoz, then besieged by the British. Wellington ordered Beresford to raise the siege and intercept the advancing enemy, the village of Albuera, 13 m. S.E. of Badajoz, being selected as the place of meeting. On the 14th the allied troops began to assemble on a ridge overlooking the village, and by the morning of the 16th over 30,000 were in position; only about 6,000 being British, the rest Spaniards and Portuguese.

Early on the 16th Soult sent a column to cross the little stream Albuera and assail the allied left. This, however, was a feint. The main French attack was directed against the right flank of the Allies. Beresford was expecting a frontal assault, and before he could wheel his men to the right the enemy was upon them and the fight for the hill began. The British 2nd division was brought from the other side of the battlefield to the aid of the Spaniards, who had met the first shock of the French, but its first brigade was almost destroyed by fire, coupled with a charge of the enemy's cavalry upon its rear. Another brigade followed up, however, and it was during this stage of the struggle that the 57th (Middlesex) regiment earned their name of the Die Hards, for their colonel, when badly wounded, called to them to "die hard." Out of 575 combatants they lost 423, and the Buffs suffered almost as heavily,

the musket fire of the French soldiers, only a few yards away, causing most of the casualties.

The confusion was terrible. Neither side had room to deploy. Beresford narrowly escaped death or capture, and, becoming unnerved, rode away and prepared for a retreat. The day was saved by Colonel Hardinge, afterwards Lord Hardinge, who ordered up the last reserves, British and Portuguese. The latter were told off to watch the French horsemen, while three battalions of Fusiliers, two of the 7th (Royal) and one of the 23rd (Royal Welsh), advanced up the hill. In describing their deeds as they went steadily forward, indifferent alike to the death in front and the disorder around, Napier writes, in one of his most memorable passages: "Then was seen with what a strength and majesty the British soldier fights," and when it was all over "only 1,500 unwounded men, the remnant of 6,000 unconquerable



Centre, Marshal Beresford is being attacked by a fallen Polish lancer, while others advance from the left. In the centre background British troops are driving the enemy up the hill, and a little farther to the right the attack on Albuera bridge is depicted. In front of the bridge are the 57th Foot (Middlesex Regt.) who gained their greatest battle honour here, May 16, 1811

**ALBUERA: EPISODES IN THE COURSE OF THIS CRITICAL BATTLE OF THE PENINSULAR WAR**

*From a print published in July, 1811, in the Crookshank Military Prints Collection, British Museum*



**Albuquerque**, AFFONSO D' (1453-1515). Viceroy of the Portuguese Indies. The son of noble parents, he was born at Alhandra, near Lisbon, and educated in the royal palace. In 1503 he made his first expedition to the Indies, and established the influence of Portugal in Cochin. Three years later, under Tristan da Cunha, he went again to the East, and made his way to the island of Hormuz in the Persian Gulf. This he seized, but kept for only a short time. In 1509, succeeding Francisco d'Almeida as viceroy of the Indies, he began at once a series of conquests. He secured Goa and Malacca and eventually Hormuz, but an attempt on Aden failed. In 1515 his enemies at the Portuguese court secured his downfall, the king sending out his foe, Soarez, to take his place. Albuquerque died at sea near Goa, Dec. 16, 1515. He was buried at Goa. His commentaries, translated into English, were published by the Hakluyt Society, 1875-84.

**Albury**. City of New South Wales, Australia, in Goulburn co. The border town and rly. change centre between N.S.W. and Victoria, it is at the head of navigation of the river Murray, 399 m. by rly. S.W. of Sydney, 191 m. N.E. of Melbourne. It lies in an area explored by Hume and Hovell in 1824. The centre of an extensive agricultural district, the Riverina, noted for its sheep (which produce first-class merino wool), cereals, dairy produce, and wine, Albury has varied secondary industries. It is the commercial capital of the Riverina, with its main business associations in Melbourne. The Hume reservoir, opened in 1936, has contributed much to the prosperity of the district. Pop. (1954) 16,779.

There is a village called Albury in Surrey, England, 4 m. E. of Guildford.

**Alcaeus** (c. 600 B.C.). Greek lyric poet. He gave his name to the alcaic metre, used by Horace and imitated by Tennyson. A native of Mitylene and of noble family, he fought on several occasions in defence of the oligarchy to which he belonged, and as a result was banished and went into exile in Egypt. Returning, he took up arms against the tyrant Pittacus, was taken captive, but magnanimously forgiven. The surviving fragments of his



Albuquerque,  
Portuguese viceroy

political poems are passionate, but manly; his love and drinking songs are characterised by sensuality. He wrote in the Aeolic dialect.

**Alcaic Metre**. Form of classical lyric poetry said to have been used first by Alcaeus of Mitylene about 600 B.C. It was adapted to Latin and much used in his Odes by Horace, and is familiar to English readers from Tennyson's imitation in his lines to Milton:

O mighty-mouthed inventor of harmonies,  
O skilled to sing of time or eternity.  
God-gifted organ-voice of England.

Milton, a name to resound for ages.

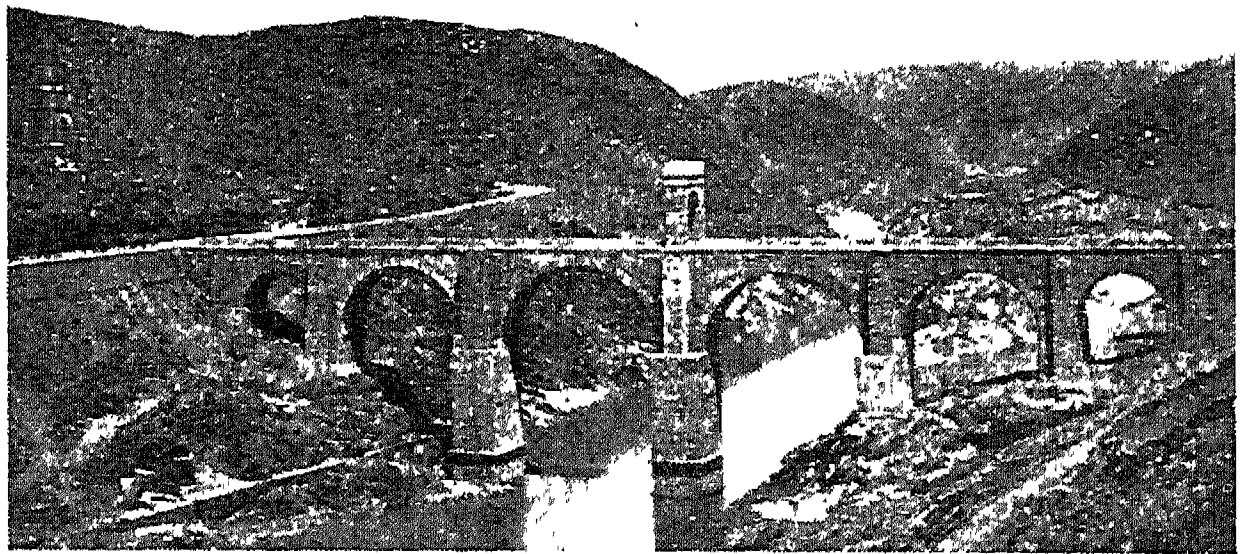
**Alcala de Henares**. City of Spain, in Madrid province. On the river Henares, it is 21 m. by rly. N.E. of Madrid. The Roman Com-

"alcalde ordinario" is a municipal officer comparable to mayor or sheriff.

**Alcan Highway**. Popular name for the Alaska Highway (q.v.).

**Alcaniz**. Town of Spain, in Teruel province. On the Guadalupe, 65 m. S.E. of Zaragoza (Saragossa), it is the conjectural locality of a victory of the Carthaginian Hasdrubal Barca over Gnaeus and Publius Cornelius Scipio, 212 B.C. The town has a medieval castle and well-preserved walls.

**Alcántara** (Arab. *al-kantarah*, the bridge). Town of Spain, in Cáceres province. On the left bank of the Tagus, 35 m. N.W. of Cáceres, it is famous for its six-arched Roman bridge, 617 ft. long, 26 ft. wide, with middle piers about 190 ft. high. Built by order of Trajan, A.D. 105, this bridge was thoroughly restored in 1860. The Roman town was called Norba



Alcántara. Roman bridge over the Tagus, built A.D. 105, and still in use. The central arches have each a span of 100 ft.

plutum and the Moorish Al-Kalah, it was the birthplace of Cervantes and of Catherine of Aragon. At its university, founded by Cardinal Ximenes de Cisneros in 1498 and opened in 1508, was produced, 1514-17, a great polyglot Bible in Hebrew, Latin, Greek, and Chaldean. Notable buildings at Alcala include the old university, a palace formerly belonging to the archbishops of Toledo, the cathedral, and the church of S. Mary, where Cervantes was baptized. Pop. (est.) 12,000.

**Alcalde** (Arabic *al-qadi*, the judge). Spanish official title for the president of the council of the commune. Usually he is chosen by the members of the council in the larger towns, but he may be appointed by the government. His position is not unlike that of an English mayor.

The title is widely used for the administrator of a provincial division in Spanish America, where the

Caesarea. The Gothic church of S. Maria de Almocóbar dates from the 13th century. In 1217 the town gave its name to the Spanish order of the knights of Alcántara.

**Alcantara**. Seaport of Brazil, in Maranhão state, 16 m. N.W. of Maranhão city.

**Alcaraz**. Town of Spain, in Albacete province. It is 36 m. W.S.W. of Albacete, with copper, tin, and zinc mines in the vicinity. It manufactures leather, wool, and linen; cattle are reared in the district. Pop. (est.) 5,500. The Alcaraz mts., the eastern extension of the Sierra Morena, run from E. to S.W. of the town.

**Alcatraz**. Small island in San Francisco bay, California, U.S.A. It is 1,650 ft. long and rises to 130 ft. It has a lighthouse, but is chiefly important as the site of a long-term federal prison (penitentiary). Here, on May 2, 1946, the convicts mutinied and, having obtained firearms from the

fore, is a science teaching how to make and compound certain medicine which is called elixir, the which when it is cast upon mettalls or imperfect bodies doth fully perfect them in the verie projection."

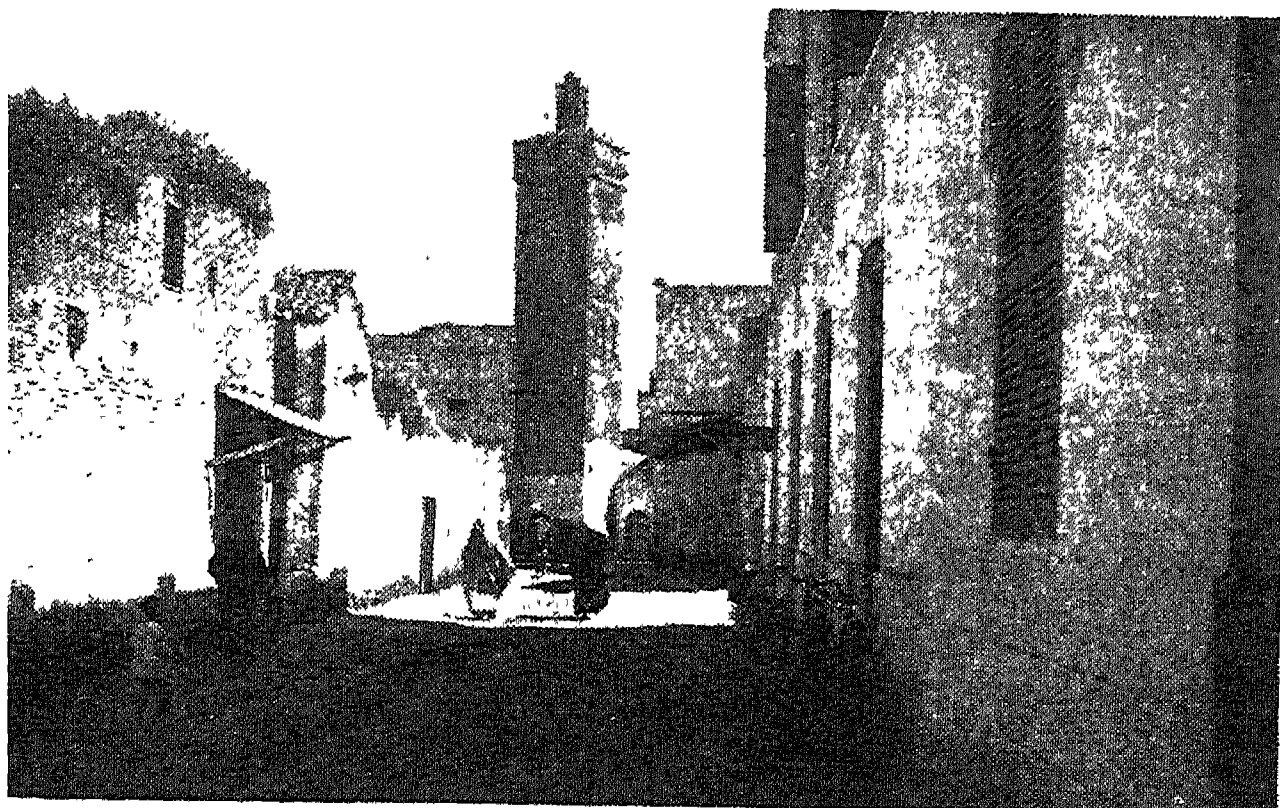
There seems no doubt that the earliest chemistry had to do with the working and colouring of metals, and that the search for medicines for the body and the applications of alchemy to technical processes were developments of metal working. The Chaldeans associated gold, silver, mercury, iron, tin, copper, and lead with the planets (Sun, Moon, Mercury, Mars, Jupiter, Venus, Saturn). They held the doctrine that metals were all made of sulphur and mercury in various proportions. The "perfect" metals were gold and silver, but the others could be changed into gold or silver and thus made perfect by "projecting" certain substances or "medicines" upon them when in a heated state.

#### Skilful Egyptian Metalworkers

According to Greek writers, the ancient Egyptians were conversant with ore-reduction, using quicksilver in the process of separating gold and silver from the native matrix. The resulting oxide was thought to possess marvellous powers, and it was supposed that there resided within it the individualities of the various metals. This black powder was mystically identified with the underworld form of the god Osiris, and consequently was credited with magical properties. There grew up in Egypt the belief that magical powers existed in fluxes and alloys.

Probably such a belief existed throughout Europe in connexion with the bronze-working castes of its several peoples. But it was probably in 4th-century Byzantium that alchemical science was first shaped.

There is little doubt that Egyptian tradition was the foundation upon which the science was built, and the art was attributed to Hermes Trismegistus and supposed to be fully explored in his works. The Arabs, after their conquest of Egypt in the 7th century, carried on the researches of the Alexandrian school, and through their instrumentality the art was brought to Morocco and in the 8th century to Spain, where it flourished exceedingly. Spain, indeed, from the 9th to the 11th centuries became the repository of alchemi-



Alcazarquivir. A street leading to the mosque of Aixa Jadra in this town in the part of Morocco formerly belonging to Spain. See p. 242

cal science, and the colleges of Seville, Córdoba, and Granada were the centres from which science radiated throughout Europe.

The first known practical alchemist was the Arabian Geber, who flourished between A.D. 720 and 750. From his *Summa Perfectionis*, it may be assumed that alchemical science was already matured in his day, and that he drew his inspiration from a still older unbroken line of adepts. He

and Bernard Trevisan (b. c. 1406), after which the centre of interest changes to Germany and in some measure to England, with Paracelsus, Kunratus (c. 1560), Maier (c. 1568), Böhme, Van Helmont the Flemish physician, Ripley, Norton, Dalton, Charnock, and Fludd. The Talmud of the 4th or 5th century and other Jewish works, incorporating much of what is known as the wisdom of Solomon, also played their part.

There was little change from the 7th to the 17th centuries, the heyday of alchemy in theory and practice. The same sentiments and processes are found in the later alchemical authorities as in the earliest, and a virtual unanimity as regards the basic canons of the great art is shown by the Hermetic students of all time.

With the introduction of chemistry as a practical art, alchemical science fell into disrepute in many quarters, owing to the number of charlatans practising it, and by the beginning of the 18th century it may be said to have been almost dead.

#### The Philosopher's Stone

The "medicine" of alchemy was abstrusely called "the philosopher's stone." There were two varieties: a white one for transmuting metals into silver, and a red one for transmuting them into gold. The philosopher's stone, dissolved in alcohol and called *aurum potable* (drinkable gold) or the elixir of life, was, when used on the human body, believed to produce eternal youth. Alchemists also sought the Alkahest, an unknown element which they believed to be a universal solvent.

There was some ground for the belief that the transmutation of



Alchemist. Eighteenth-century impression of laboratory with an alchemist watching an experiment  
After Joseph Wright of Derby

was followed in Arab countries by Avicenna, Mesna, and Rhasis, in France by Alain de Lisle, Arnold de Villanova, and Jean de Meung the troubadour; in England by Roger Bacon; and in Spain by Raymond Lully. Later, in French alchemy, the best known names are those of Flamel (b. c. 1330),



*Bibliography.* Les Origines de l'Alchimie, M. P. E. Berthelot, 1885; Alchemy, Ancient and Modern, H. S. Redgrove, 1922; Alchemy, Child of Greek Philosophy, A. J. Hopkins, 1935; Witchcraft, Magic, and Alchemy, Grilhot de Givry, tr. J. C. Locke, 1931; The Alchemists, F. Sherwood Taylor, 1952.

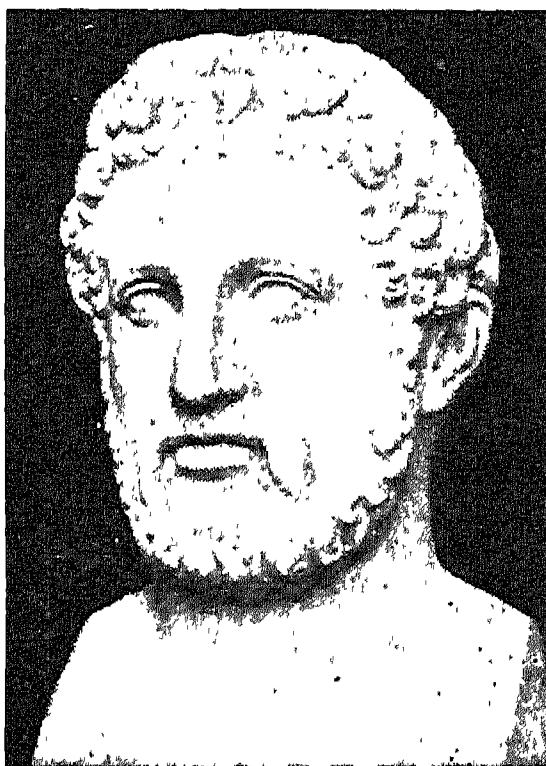
**Alciati**, ANDREA (1492-1550). Italian jurist and humanist. He was born Jan. 12, 1492, at Alzate, and studied at Milan, Pavia, and Bologna. During 1518-33 he was professor of jurisprudence at Avignon, after which he returned to Italy, dying at Pavia. He was one of the first to advocate a study of history and philology to help in interpreting Roman law.

**Alcibiades** (c. 450-404 B.C.). Athenian statesman and general. The son of Cleinias, he was born at Athens during the ascendancy of his kinsman Pericles. Endowed with rank, wealth, and personal beauty, he remains a most striking example of brilliancy ruined by recklessness and lack of principle. He was among the companions, though not the imitators, of Socrates, who saved his life at the battle of Potidaea (432 B.C.), and whose life he saved in return at the battle of Delium (424).

Shortly afterwards Alcibiades plunged into politics, his brilliant qualities and lavish expenditure connected with the state services securing him a dangerous and unstable popularity. He stirred up the Athenians to organize the expedition against Syracuse in 415, when the war between Athens and Sparta was suspended. Alcibiades procured his own appointment to the command with two other generals, but on the eve of the expedition Athens was horrified by the midnight mutilation of the sacred images called Hermae. Alcibiades was charged with this and other sacrilegious offences. But his enemies waited until he had sailed in the expedition to Sicily before openly impeaching him. He was summoned from Sicily to meet the accusation. Perhaps conscious of guilt, certainly in a spirit of revenge, he betook himself to Sparta instead of returning home, and there set about intriguing for a renewal of the war against his native city.

Having succeeded, Alcibiades crossed over to Ionia, to carry out further treasonable projects against Athens. But when he discovered that some of the jealous Spartan magnates were endeavouring to bring about his own downfall, his anger turned against them. Going in 412 to

the court of the Persian satrap Tissaphernes, who was in alliance with the Spartans, he acquired great influence, which he now employed in favour of the Athenians. As a result Tissaphernes changed sides and Alcibiades was reinstated in the favour of his countrymen (411). Elected to the command of their armies without returning to Athens, he achieved a series of military and naval successes during



Alcibiades, Athenian statesman and general

Bust in the Villa Albani, Rome

the next four years, at the end of which he was received by the Athenians with enthusiasm. Two defeats, however, again deprived him of popular favour, and he retired to his estate in the Thracian Chersonese, whence, after the fall of Athens in 404, he returned to Asia Minor, probably intending to seek the favour of the Persian king Artaxerxes. But before he could carry out this plan he was assassinated. See Greece: History.

**Alciformes.** Order of birds. More familiarly known as the auk family, it includes the puffin, razorbill, and guillemot. See Auk.

**Alcinous.** Legendary hero of Greece. In Homer's *Odyssey* he is represented as king of the Phaeacians and dwelling on the island of Scheria, identified by some with Corfu. During his wanderings Odysseus and some companions were shipwrecked on the island, where they were hospitably received before being sent on their homeward way. The halls and gardens of Alcinous were regarded as exceptionally splendid, and his subjects had a great reputation as skilled seamen.

**Alciphron.** Greek writer of the 2nd century A.D. He was the author of a collection of letters valuable for the light they throw on the manners and customs of the fishermen, peasants, parasites,

and courtesans of the Athens of the 4th century B.C.

**Alcira.** Town of Spain, in Valencia province. On the Júcar, 23 m. S. of Valencia by the rly. to Alicante, it trades in silk, rice, and oranges, and exports timber. Pop. 22,057.

**Alcmaeon.** In Greek legend, son of Amphiaraus and Eriphyle. Charged by his father with the duty of taking vengeance upon Eriphyle, who, bribed by the necklace of Harmonia, had persuaded her husband to join the fatal expedition against Thebes, Alcmaeon killed his mother. For this he was pursued by the Furies and, after many wanderings, reached Psophis in Arcadia, where he was purified of his crime by King Phegeus. He married first Arsinoë, daughter of Phegeus, to whom he gave the necklace of Harmonia, and, after divorcing her, Callirrhoë, daughter of a river god. Callirrhoë desiring to possess the necklace, Alcmaeon obtained it by a trick, but was slain by the brothers of Arsinoë.

**Alcmaeon of Crotona.** Greek physician and philosopher. A younger contemporary of Pythagoras, he lived about 500 B.C. and taught the doctrine of opposites (right and left, light and darkness). The soul was situated in the brain and, like the stars, was eternally in motion. Sensations were conveyed through pores or passages to the mind.

**Alcmaeonidae.** Noble family of ancient Athens, descendants of Alcmaeon, a Dorian immigrant from Pylos. A member of this family, Megacles, killed the insurgent Cylon and his supporters, after they had left the sanctuary of the altars of the gods on the Acropolis under a promise that their lives should be spared (c. 630 B.C.). Megacles was declared to have committed an abominable sacrilege, and the whole family was banished from the city. They did not return permanently to Athens until 509. They joined the popular party, and the head of the family, Cleisthenes, was responsible for the new and more democratic constitution at Athens. See Cleisthenes.

**Alcman** (c. 620 B.C.). Greek lyric poet. Born at Sardes in Lydia, he was the author of hymns, epinikia (songs of victory) and parthenia (songs intended to be sung by choruses of maidens). He wrote in the Doric dialect, with an admixture of Aeolic elements.

**Alcobaça.** City of Portugal, in Leiria district. Picturesquely situated between the Alcoa and Baça rivers, it is 60 m. N. of

**MEDICAL EFFECTS.** Alcohol is a narcotic, a disinfectant, and a local irritant. It is also a food which is quickly absorbed from the stomach and the small intestine. There is normally a small amount present in the blood and the tissues. Small quantities are excreted in the breath and in the urine, but most of it is used by the body. It is oxidised in the liver via acetaldehyde and acetate to carbon dioxide and water. It is thus a source of energy and so a "carbohydrate sparer."

In high concentration (2 p.c. to 3 p.c.) in the blood, alcohol causes depression of the heart and of the nervous system, and the temporary release of excessive inhibition. Since the release of inhibition allows more primitive impulses to be expressed, alcohol is frequently taken to give "Dutch courage." It allays anxiety temporarily, but also interferes with coordination and finer judgement.

#### Effects on the Body

Alcohol increases the blood flow to the surface of the body, giving a feeling of warmth. This heat is dissipated more readily on exposure to the cold, and it is therefore not advisable to drink before going out into cold air. It is sometimes given to revive people who feel faint; it does this by raising the blood pressure. People with raised blood pressure should not drink alcohol; and people unaccustomed to drinking should never drink a large quantity of alcohol just before taking a barbiturate for insomnia as the action of the two drugs taken one immediately after the other may cause death.

When applied locally, alcohol hardens the skin, and for this reason is used to prevent bedsores. A 90 p.c. solution injected will cause degeneration of a nerve and is sometimes used to relieve the pain of trigeminal neuralgia.

**INDUSTRIAL USES.** Alcohol is used as a solvent for varnishes, lacquers, artificial silk and other plastics, and for many fine chemicals, including perfumes, flavouring essences, and pharmaceutical products.

As an intermediate, it is required in large quantities for making butadiene (in the synthetic rubber industry), chloroform, ether, acetone, acetic acid, ethyl ether and other ethyl derivatives. It is useful also for cleaning, drying, and preserving, as an antifreeze liquid to mix with water, and as a fuel on a small scale, e.g. in spirit-lamps. It is also a valuable substitute for petrol as an engine-fuel. It has the

advantages of a high knock rating (above 100 octane), and high latent heat giving excellent change cooling; but it has low calorific value, and may cause icing of carburettors.

Industrial and power alcohol is produced by three main processes. In the first, ethylene obtained by the cracking of petroleum or from natural gas is passed into concentrated sulphuric acid under pressure, when it forms ethyl hydrogen sulphate. The mixture is then diluted with water and hydrolised by boiling, and the alcohol distilled out. The purity of the alcohol produced depends on the quality of the ethylene.

The second method involves the reduction of acetaldehyde, obtained from acetylene.

The third and most important is by distilling (*q.v.*) from fermented vegetable products, of which the chief are molasses (a by-product of sugar refining containing 50 p.c. fermentable sugar), grains and potatoes (containing starch), and wood, wood pulp, etc. (containing cellulose).

#### "Absolute" Alcohol

The alcohol produced in most industrial distilling processes still contains about 10 p.c. water. Further distillation will give spirits containing about 95 p.c. alcohol, called rectified spirits. It is not possible to remove more water by distilling, because there is a constant-boiling mixture of 4.4 p.c. water and alcohol which has a boiling point (78.1° C.) very close to that of alcohol itself (78.3° C.). Pure, anhydrous, or "absolute" alcohol can be obtained from rectified spirit by treatment with certain drying chemicals such as quicklime. Commercially the water is removed by the addition of benzene and the distillation of the mixture: the water, benzene, and a little alcohol distil off first, leaving absolute alcohol behind; the process is called azeotropic distillation. The last traces of water in alcohol, present because alcohol rapidly absorbs water from the air, can be removed with metallic calcium which is converted into calcium hydroxide (lime).

Because of the high excise duty imposed on drinkable alcohol in most countries, industrial alcohol is usually "denatured" by the addition of other chemicals which make it nauseous to taste. Formulae are regulated by law, and the denatured alcohol, dyed violet to distinguish it, is called methylated spirit.

**CHEMISTRY OF ALCOHOL.** Ethyl alcohol is one of a large group of organic compounds which include an hydroxyl group ( $-OH$ ) attached to a carbon atom. The (primary) aliphatic alcohols form an homologous series of which the first four members are methyl alcohol, carbinol, or methanol,  $CH_3OH$ ; ethyl alcohol or ethanol,  $C_2H_5OH$ ; propyl alcohol or propanol,  $C_3H_7OH$ ; butyl alcohol or butanol,  $C_4H_9OH$ . When the number of carbon atoms reaches 16 or more the alcohol is solid at room temperatures: e.g. cetyl alcohol or hexadecanol,  $C_{16}H_{33}OH$ ; ceryl alcohol  $C_{26}H_{53}OH$ ; melissyl alcohol,  $C_{31}H_{63}OH$ .

All these, having only one hydroxyl group, are called monohydric alcohols. Dihydric alcohols or glycols (e.g. ethylene glycol) have two hydroxyl groups; trihydric alcohols (e.g. glycerol, glycerin or glycerine) have three.

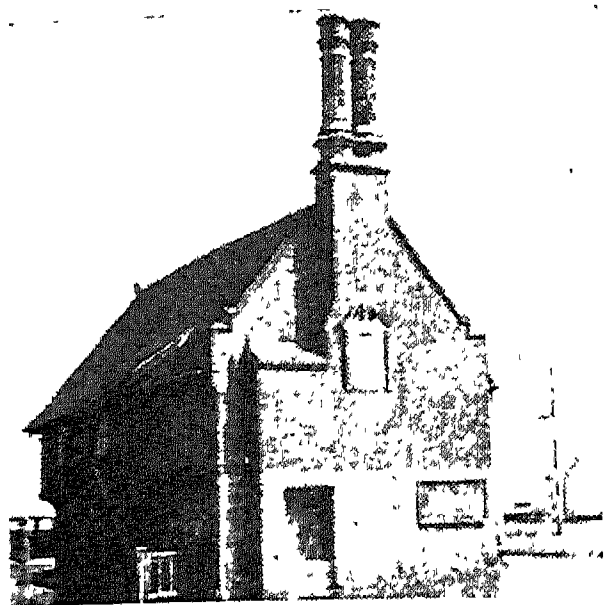
Alcohols with even larger numbers of hydroxyl groups occur in nature; erythrol or erythritol, found in certain lichens, has four hydroxyl groups; mannitol, found in many fungi and in silage, has six. The solubility of alcohols in water decreases as the proportion of oxygen to carbon in the molecule decreases.

Pure ethyl alcohol,  $C_2H_5OH$ , is a colourless mobile transparent liquid. It is lighter than water and has a penetrating somewhat ethereal smell. It burns easily with a blue smokeless flame, is completely miscible with water in all proportions, and when the mixing occurs there is a rise in temperature and a decrease in volume. It has been found in the fruit of the parsnip (*Peucedanum sativum*) and of the giant cow parsnip (*Heracleum giganteum*); otherwise it does not occur in any quantity in nature.

Alcohols are also classified as: primary, when the carbon atom to which the hydroxyl group is attached has two (or in methyl alcohol three) hydrogen atoms also attached to it; secondary, when the carbon atom carrying the hydroxyl group has one hydrogen atom; tertiary, when it has none. These three classes differ considerably in their chemical behaviour.

**Alcoholics Anonymous.** Informal fellowship of former victims of alcoholism founded 1935 in Akron, U.S.A. Its sole purpose is to help the alcoholic to recovery. It is not allied to any other body, and the one requirement for membership is an honest desire to stop drinking. There are no fees. Members, known, in order to





Aldeburgh. The 16th-century moot hall of this Suffolk seaside resort

A shade less bright than first magnitude and conspicuous for its ruddy colour, it is the chief object in the group of the Hyades, its intrinsic light being some 95 times that of the sun. For its position, see map under Constellation.

**Aldeburgh** OR ALDEBOROUGH. Borough and seaside resort of Suffolk, England. A fishing centre on the Alde estuary, 99 m. E.N.E. of London, Aldeburgh has a half-timbered 16th-century moot hall, a relic of the town's former importance before the silting-up of the river ruined the trade of the port. It was the birthplace of the poet Crabbe, and a favourite resort of Edward Fitzgerald and George Meredith. It returned an M.P. until 1832. In 1908 it elected the first woman mayor in England (Elizabeth Garrett Anderson). The composer Benjamin Britten, a resident, helped to start an annual musical festival here in 1948. Pop. (1951) 2,689.

**Aldehydes.** In organic chemistry, a class of compounds, the simpler members of which are very reactive liquids with characteristic odours. The name was taken from the initial syllables of *alcohol dehydratus*, because the first aldehyde discovered, acetaldehyde, was made by removing hydrogen from ethyl alcohol. Other common examples are formaldehyde (a gas, called formalin when dissolved in water) and benzaldehyde (responsible for the taste and smell of almonds). The aldehyde group consists of a carbonyl group with a hydrogen atom attached to its carbon atom. Aldehydes are thus easily oxidised to acids or reduced to alcohols. They can be prepared by the reduction of acids through the acid chloride; by careful oxydation of primary alcohols; or by heating certain metallic salts of organic acids; and by various methods used in industry.

Aldehydes may be either aliphatic compounds or aromatic

compounds. The two kinds have many properties in common. They both react with amines and similar bases. They both add on sodium bisulphite to give crystalline derivatives which are useful for purification processes. They both give a positive test with Fehling's Solution (*q.v.*). Many sugars which are aldehydes (*e.g.* glucose) give this test, which is therefore used in medical practice to discover an excess of excreted sugar in urine (*see* Diabetes). A similar but much more sensitive test is the precipitation of silver from ammoniacal silver nitrate.

An important difference between aliphatic and aromatic aldehydes concerns reactions in which a hydrogen atom on the carbon atom next to the carbonyl group is involved. Aliphatic aldehydes, which possess such a hydrogen atom, undergo a wide range of reactions, such as the

aldol reaction, in alkaline solution. Aromatic aldehydes (together with formaldehyde and one or two other heavily substituted aliphatic aldehydes) have no hydrogen atom on the carbon atom next to the carbonyl group. In similar conditions these undergo a reaction, discovered by the Italian chemist Cannizzaro, in which two molecules of aldehyde are converted into one of alcohol and one of acid. Thus benzaldehyde with alkali is converted into a mixture of benzoic acid and benzyl alcohol.

Many aldehydes have a tendency to polymerise and in some crystalline polymers have been isolated.

**Alden**, JOHN (c. 1599–1678). One of the Pilgrim Fathers. In 1620 he sailed as a cooper in the Mayflower, and settled at Duxbury, Massachusetts, where for more than 40 years he served as magistrate and sometimes as acting



Alcuin. Frontispiece to the Alcuin Bible, in Latin, produced at Tours c. 840. It shows the evangelists and their emblems with Alcuin (centre). See p. 248

British Museum

homes and made their way to England. The rest, with the exception of one family which refused to move, were deported by the Germans, who strongly fortified Alderney and established a concentration camp for French Jews on the island. After the general German surrender, May 7, 1945, British forces landed on May 16, taking prisoner 3,200 Germans still on the island. The inhabitants began to return in Dec. Heinrich Adler and Adam Evers, controllers of the concentration camp, were in Paris given 10 and 7 years' imprisonment respectively in 1949, for ill-treating prisoners.

**Aldersgate.** Name of a ward of the City of London and of a street running N. from St. Martin's-le-Grand to Goswell Road. The old gate at the S. end of the street was the N. gate of the city, and is supposed to have been erected by one Aldrich, a Saxon. Rebuilt in 1618 and damaged in the Great Fire, it was finally razed in 1761. John Day, the 16th century publisher, lived over the gate. Notable residents of Aldersgate Street included Mary countess of Pembroke, and Milton. In the grounds of S. Botolph's is Postman's Park, where G. F. Watts inaugurated in 1900 memorial tablets to heroes who gave their lives while performing civilian duties. Wide areas on both sides of Aldersgate Street were devastated as the result of German incendiary and H.E. bombs, 1940-41, particularly on the night of Dec. 29, 1940.

**Aldershot.** Municipal bor. of Hampshire, England. Situated on the immediate boundaries of Hampshire and Surrey, 34 m. S.W. of London by rly., its charter of incorporation was granted in 1922. The constitution of the borough council is unique in that three of its members are military officers serving in the adjacent camp and nominated to the council by the under-secretary of state for war. That Aldershot has grown from a village with 875 inhabitants in 1851 to a town with a pop. of 36,184 in 1951 is due to the establishment of this large camp.

Just as Shorncliffe camp, near Folkestone, was selected for its strategic position during the Peninsular War, and

Catterick, near Richmond, Yorks, developed from the exigencies of the First Great War, so Aldershot owes its inception to the Crimean War.

As a result of that campaign, it became evident that the regular army would have to establish camps where training facilities existed for the practical training of troops in the field. Lord Hardinge, then C.-in-C., urged for this purpose the purchase of waste land known as Aldershot Heath. In 1854 the War Office was granted £100,000 for the erection of the camp, and in 1855 the provision began of a camp of wooden huts. It was not until some 25-30 years later that more permanent accommodation was provided.

Until 1941 Aldershot was recognized as the chief training command of the British Army. A number of factors, including the possibility of S.E. England being an invasion area, were responsible for the loss of some of Aldershot's military importance. It was reduced in status in 1941 from command to district, becoming the headquarters of Aldershot and Hants district under G.O.C. Southern Command. In the Aldershot area are two sub-districts, North and South Aldershot. South Aldershot, separated from North Aldershot by the Basingstoke Canal, includes Wellington and Stanhope Lines, with barracks at Bordon, Longmoor, and Whitley, and a number of camps erected during the Second Great War. North Aldershot consists of Marlborough Lines, with barracks at Black-

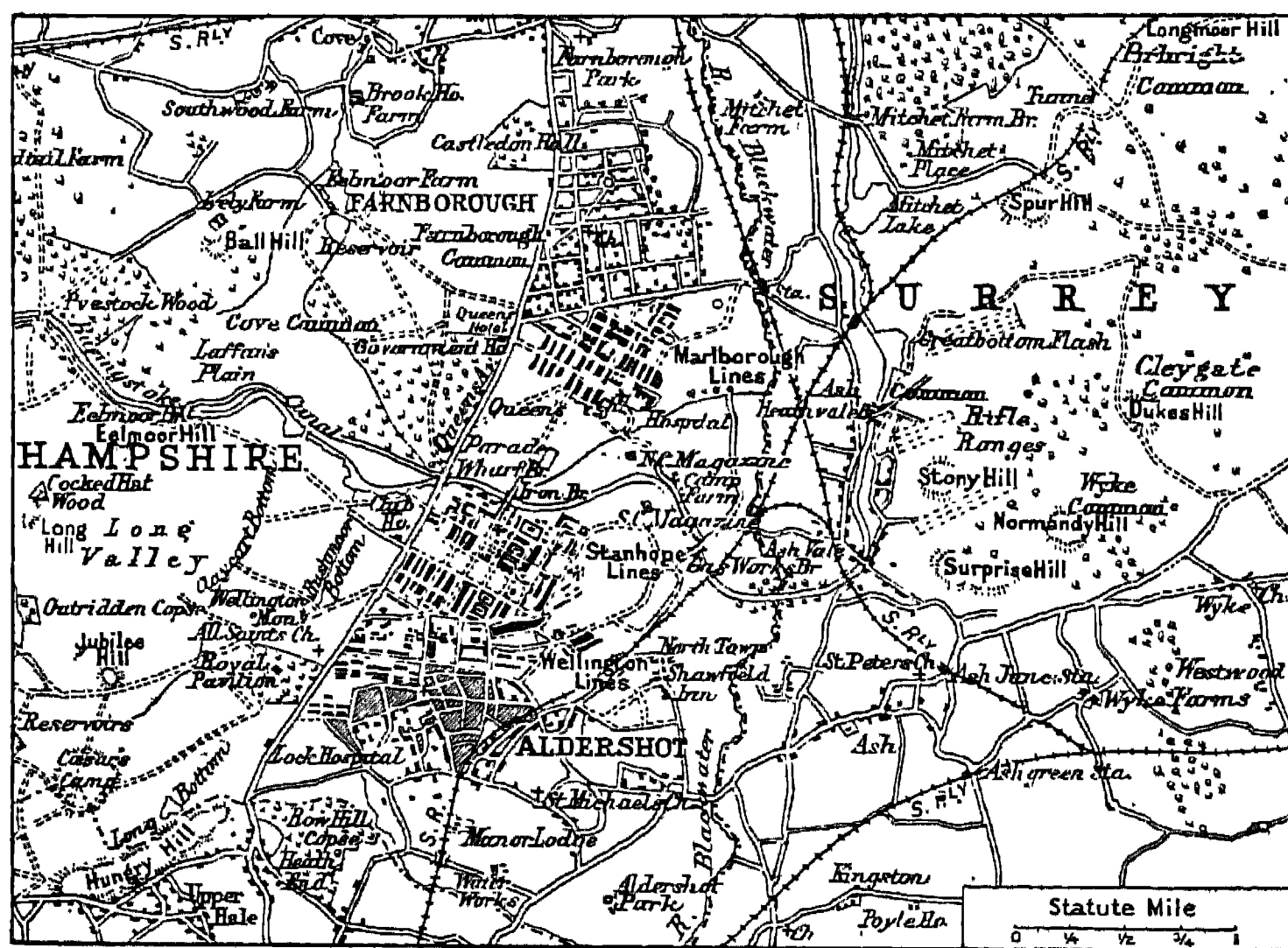
down, Deepcut, Cove, and Crookham, and a few scattered camps.

Accommodation is now provided for some 60,000 troops as compared with 20,000 in 1914. The garrisons are complete with all ancillaries for their maintenance—supply stores, butchery, bakery, electric power and water plants, workshops, offices, churches, and some 1,700 quarters for families of married soldiers. Amenities are also on a generous scale.

It was from Aldershot that the first division of the B.E.F. left for France in 1914; 25 years later the 1st and 2nd divisions of the B.E.F. also left Aldershot for France. During the Second Great War, the average pop. of N. and S. Aldershot sub-districts was 125,000. All Canadian divisions were successively accommodated in Aldershot on arrival in the U.K. From the fall of France to the end of the war, one camp was permanently allotted to the Fighting French. Aldershot also accommodated one of the greatest concentrations of the A.T.S. in the country, an average of some 7,000 women. Other commitments included a New Zealand div. and a Polish armoured div.

Aldershot gives its name to a county division returning one member to Parliament.

The colossal equestrian statue of Wellington, by Matthew Wyatt, on the W. side of Queen's Avenue, originally surmounted an arch opposite Hyde Park Corner, London. It was removed to Aldershot in 1883.



Aldershot : Plan of Britain's premier military camp and army training ground



**Aldringer**, COUNT JOHANN VON (1588-1634). Soldier of the Holy Roman Empire. Born at Thionville, he entered the Spanish army, 1606, and when, in 1618, the Thirty Years' War began, he took service under the emperor Ferdinand II. Aldringer fought against the German Protestants, the Swedes, and the French, his reputation among the Imperial generals being inferior only to those of Wallenstein and Tilly, under both of whom he served. He was killed at Landshut, Bavaria, July 22, 1634.

**Aldwych**. London thoroughfare, opened by Edward VII, Oct. 18, 1905. It runs convexly from

and considerable superficial damage to buildings. See Kingsway.

**Aldwych Club**. London club founded in 1911 as a social centre for advertising men. In 1914 it became a general business club. The subscription is 6 gs. a year. The club house is 18, Exeter Street, Aldwych, W.C.

**Aldwych Theatre**. London playhouse, built by (Sir) Seymour Hicks and opened Dec. 23, 1905, with a revival of his own play for children *Bluebell in Fairyland*. From 1925 to 1933 the theatre was noted for a continuous series of farces, eleven in number, all but two of which were written by Ben Travers. They included *A Cuckoo*

in the Nest, *Rookery Nook*, *Thark*, and *Turkey Time*, and the same principals, Ralph Lynn, Tom Walls, J. Robertson Hare, and Mary Brough were retained for all of them.

**Ale**. Name given to all malt liquor in England before the introduction of hops in the 16th century. It is now applied

to lighter coloured beer. See Beer; Brewing.

**Aleander**, HIERONYMUS, OR GIROLAMO ALEANDRO (1480-1542). Italian humanist and cardinal. Born at Motta, near Treviso, he was early distinguished for scholarship, and after acting as rector of the university of Paris was

sent by Eberhard, prince-bishop of Liège, to Rome. In 1519 he became librarian of the Vatican. A strong opponent of Luther, against whom he prepared the imperial edict, he endeavoured to check the reform movement in the Netherlands. He was made archbishop of Brindisi in 1524 and a cardinal in 1536.

**Aleardi**, ALEARDO (1812-78). Italian poet. Born at Verona, Nov. 4, 1812, he became a professor at the Academy of Fine Arts, Florence. His work is notable rather for graceful description than for force of sentiment or emotion. At Verona, where he died, July 17, 1878, a monument has been erected to his memory and a bridge named after him.

**Alecto**. In Greek mythology, one of the Furies or Eumenides (*q.v.*).

**Alekhine**, ALEXANDER (1892-1946). World chess champion. Born in Moscow, Nov. 1, 1892, the son of a nobleman, he left Russia during the 1917 revolution, becoming a naturalised Frenchman in 1927. His mastery of chess was



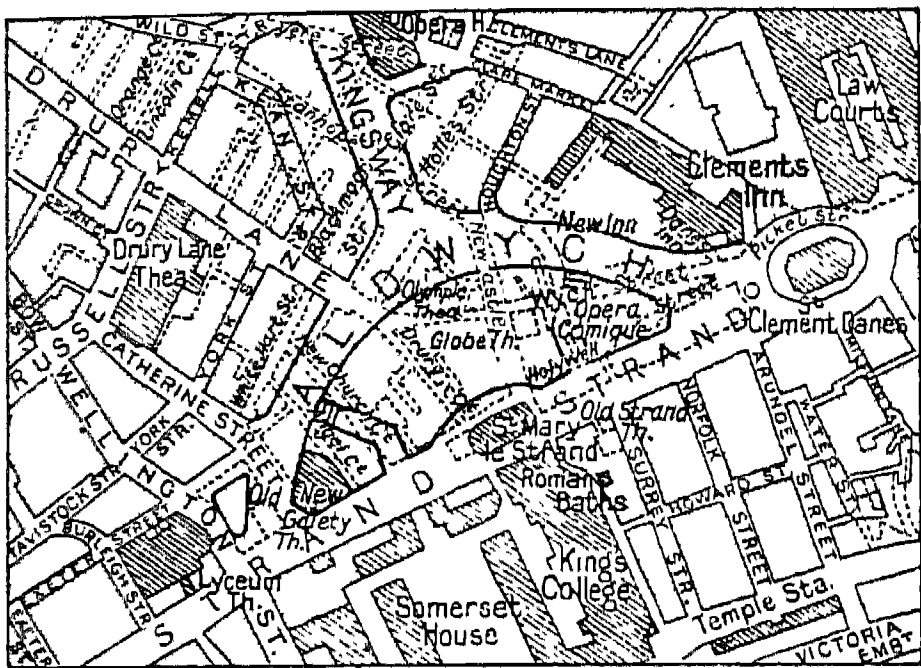
Alex Alekhine, chess champion

evident in boyhood, and after winning several tournaments he defeated J. R. Capablanca (*q.v.*) for the world championship in 1927. He lost the title to the Dutchman Max

Euwe, 1935, but regained it in 1937. At the San Remo tournament, 1930, he set up a world scoring record. He was found dead in Lisbon, March 24, 1946.

**Alemán**, MATEO (1547-c. 1609). Spanish novelist whose fame rests on his long novel, *Guzman de Alfarache*, 1599-1604, which gives a lively picture of Spain in his day. Born and educated at Seville, he entered the public service in 1571, and after a somewhat troubled life migrated in 1608 to America, probably to Mexico.

**Alemanni**. Name given to a confederacy of Germanic tribes which first came into prominence around the river Moenus (Main) in the 3rd century A.D. The duchy of Alemannia (Swabia) was named after them, and from them are derived the French names *Allemand* and *Allemagne* for German and Germany. At one time the Alemanni spread into Alsace and Switzerland. They fought against the Romans and Franks, but were subdued by Clovis in 496.



Aldwych. Plan of the London thoroughfare superimposed on a map showing the old landmarks which it displaced

the Strand, diverging N.E. at the intersection of Wellington Street and returning near S. Clement Danes. Among the buildings of the island block thus formed are Australia House (1918), India House (1930), and Bush House (1923-34). Aldwych is now a one-way street, for eastbound traffic only. The name is derived from the Danish settlement that once occupied the site. It had already been perpetuated in Wych Street, but this, with the parallel Holywell Street (or Booksellers' Row), was demolished in the improvements. On June 30, 1944, a German flying bomb fell at the junction of Aldwych and Kingsway in the early afternoon, causing many casualties



Aldwych. Western end, with former Gaiety Theatre on right and Waldorf Hotel farther along on left

founded in 1168, and named after Pope Alexander III. In 1174 it withstood a six months' siege by Frederick Barbarossa. Ceded to Savoy in 1713, it has a citadel, built in 1728, enlarged by the French in 1800-14, partially destroyed by the Austrians in 1815, and subsequently enlarged by the kings of Piedmont. It has several old churches and palaces. Alessandria, an important rly. junction, produces wire, fertilisers, and cotton goods. The battle of Marengo (*q.v.*) was fought 2 m. N.W. of Alessandria. Pop. (1951) city, 83,808; prov., 484,034.

**Alesund.** See Aalesund.

**Aletsch.** Glacier of Switzerland, the most extensive icefield in the country. Formed chiefly of the snows of the Jungfrau and the Aletschhorn, it is on the S. slope of the Bernese Alps and is



**Aletsch.** In the Bernese Oberland, Switzerland, is the Aletsch glacier, which is nearly 13 miles long

nearly 13 m. long. The Aletschhorn, the second highest summit of the Bernese Alps, is 13,700 ft. high.

**Aleutian Islands.** Chain of about 150 islands extending in curved formation W. from Alaska Peninsula. They extend 1,100 m. towards the Russian Komandorskie (Commander) Islands, off the E. coast of Kamchatka, which geologically are an extension of the same chain. The islands, which form part of the U.S. territory of Alaska, are bare and rocky, and contain numerous volcanic peaks, some active, some dormant. The climate is very damp and foggy, but not severe. Unimak, nearest the mainland, and Unalaska are among the largest. Foxes, reindeer, dogs, and other mammals abound, but are decreasing in number; whale, seal, and otter fisheries are declining. The inhabitants are princi-

pally Aleuts, a branch of the Eskimo people, and belong to the Greek Church. The climate is moist and the temperature moderate. The islands were discovered by Bering and Chirikov in 1741.

In 1928 the McCracken-Stoll expedition found on one of the islands the mummified bodies of three adults and a child of the Stone Age. The bodies were in a perfect state of preservation. The clothing was intact, as were the domestic articles, hunting weapons, and other paraphernalia which had been buried with them.

With the attack of Japan on the U.S.A. in 1941, possession of the Aleutians, because of their strategic value, became of great importance to both sides. The islands are the nearest U.S. land to Japan. In June 1942 the Japanese attacked the U.S. supply base of Dutch Harbor, on Unalaska, 2,300 m. from Tokyo; they were forced back by air defences; in the same month they established footholds on the westernmost islands of Kiska and Attu, where they remained for

about a year, under regular observation and attack from the air. On May 11, 1943, U.S. troops landed on Attu and destroyed the Japanese garrison in fighting lasting until June 4. The Japanese on Kiska, now out-flanked, withdrew: occupa-

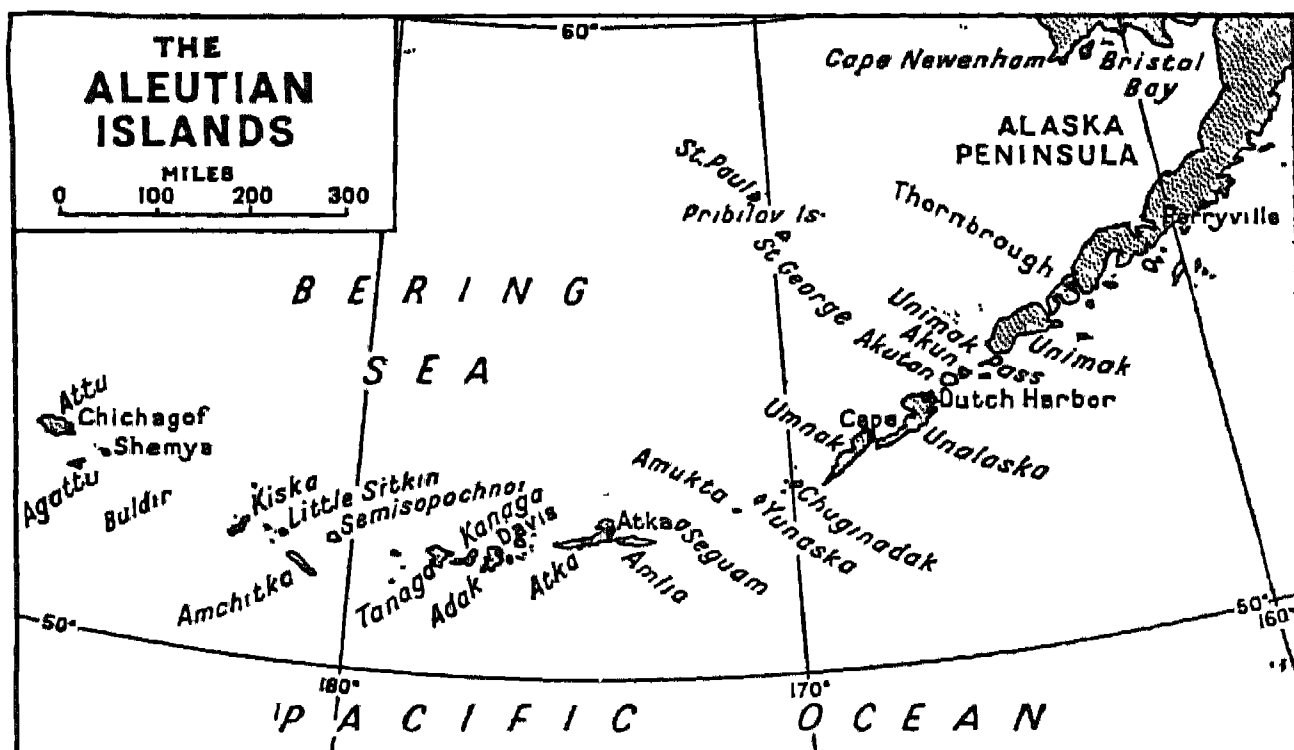
tion of that island by U.S. and Canadian forces in Aug., 1943, brought the whole Aleutian chain once more under Allied control. It was developed as a base from which offensive operations could have been conducted against Japan.

**Alewife** (*Pomolobus pseudoharengus*). Small fish, occurring chiefly in the seas, rivers, and lakes of N. America. In length from 8 ins. to 10 ins., it is related to the shad and herring, resembling the former in colour and shape. In the U.S.A. it is an important food fish. The name is due to a fancied resemblance to a corpulent female beer-seller.

**Alexander.** Name of eight popes, the two most important of whom are noticed separately below. Of the remainder, Alexander I was bishop of Rome A.D. 107-116, is sometimes said to have been martyred, and was recognized as a saint. Alexander II (Anselm, bishop of Lucca) was pope 1061-73; chosen owing to the influence of Hildebrand, he was opposed by an antipope, Honorius II, whom at length he overcame. Alexander IV (Roland Conti, cardinal-bishop of Ostia and Velletri), pope 1254-61, failed in an attempt to unite the Greek and Roman Churches. He quarrelled with the Ghibelline party, excommunicated King Manfred of Sicily, assigned the two



**Aleppo.** Overlooking the ancient Syrian trade centre is the medieval citadel. The city, surrounded by desert, is noted for its beautiful gardens







Alexander, king  
of the Hellenes

the crown prince George, and Alexander was chosen in his stead. He ascended the throne, June 13, 1917, and died Oct. 25, 1920, from the bite of a pet monkey.

**Alexander.** Name of five kings of Macedonia, the third being Alexander the Great. Alexander I (498-454 B.C.), son of Amyntas I, accompanied Xerxes on his expedition against Greece. But his sympathies were with the Greeks, and before the battle of Plataea (479) he betrayed the positions of the Persian army, Greece gave him the name of Philhellen, and

admitted him to the Olympic games. Alexander II (369-367), the son of Amyntas II, after a successful campaign waged against Alexander of Pherae, engaged in a struggle with his half-brother, Ptolemy Alorites, by whom he was assassinated. Alexander IV, Aegus, was the posthumous son of Alexander the Great by Roxana. He was under the care of different guardians until 316, when he was imprisoned by Cassander, who put him to death in 311. Alexander V (297-294), son of Cassander, quarrelled with his brother Antipater about the throne, and accordingly sought the aid of Demetrius Poliorcetes. Before the latter arrived, the brothers were reconciled. Alexander was murdered by Demetrius, whose help he scornfully refused.

Darius of Persia, the "great king," was lord of all western Asia and of Egypt, though Egypt and the Greek cities on the coast were ready to break away from



Alexander the Great attacking  
Poros, King of India, (on an  
elephant) at the Battle of Hydaspes  
From 4th cent. coin in British Museum

## ALEXANDER THE GREAT: 356-323 B.C.

*An account of the life of the famous conqueror, who established the first of the world's great empires. For related information see also Afghanistan; Alexandria; Greece; Macedonia; Persia; Phoenicia; Syria*

Alexander the Great was the son of Philip II, king of Macedonia, whom he succeeded on his assassination in 336 B.C. Educated by Aristotle, he was richly endowed with natural abilities, physical strength, immense energy, and ambition, and he brilliantly distinguished himself when only a youth at the battle of Chaeronea. He promptly displayed his quality

by crushing first the risings of his own northern tribes, then a threatened revolt among the Greeks.

Twelve months after Philip's death, his son's supremacy was completely established. Early in 334 Alexander crossed the Hellespont (Dardanelles) with an army, to carry out Philip's projected conquest of the Persian empire.

the Persian yoke. Vast hosts were under his control, but Alexander had at his disposal the famous Macedonian army and the Greek soldiery. His scheme of conquest was systematic and thorough, though it depended upon calculated audacity. Asia Minor, the hammer-head west of the Taurus mountain range, was his first objective, and his first task was to shatter at the river Granicus (334) the great force brought against him by the satraps or governors of the western provinces. His victory there secured prompt submission, but the Persians still held the seas. The western ports

had to be secured before, in the summer of 333, he was completely master of Asia Minor.

Then Darius gave him his opportunity by advancing with an enormous host and occupying on the banks of the river Issus a position in which the bulk of his troops could not be brought into action, Alexander having already pierced the mountain passes of Cilicia. On the Issus in 333 the Macedonians won an overwhelming victory; Darius and his army fled, the royal family and vast spoils falling into the conqueror's hands.



Alexander the Great. On a great sarcophagus found at Sidon, now in Istanbul, carved reliefs executed shortly after Alexander's death show, among other scenes, the king leading his troops to victory over the Persians. In the portion reproduced here, Alexander (left) wearing the lion's skin of Heracles, engages a Persian cavalryman

From Hamdy Bey et Reinach, "Une Nécropole royale à Sidon"

Death at the age of thirty-two was a catastrophe for which no preparation had been made in Alexander's scheme of empire. The great fabric he had reared depended for its permanence on the continued control of a supreme genius; after a time the supreme genius would have become unnecessary, provided that the supreme authority was both universally recognized and capable. But no provision had been made for an adequate supreme authority to take the place of Alexander in case of his death. There was no heir to his sceptre except an infant, no minister of the great conqueror who could assume and exert an undisputed authority. The inevitable result of Alexander's premature death was the disintegration of the new empire, which in effect took the form of its division among the most powerful of his generals and lieutenants, who with their successors are commonly called the Diadochi.

It is not easy to realize the vast imaginative genius of the man who conceived the idea, not merely of leading victorious armies from one end to the other of the whole known world, like a Jenghiz Khan or a Tamerlane, but of fashioning the whole known world into a single vast community, homogeneous in one of its aspects, yet recognizing differentiations of race and of customs; an idea which has more nearly reached fulfilment in the British empire than in any other that the world has known, even including that of Rome. And in Alexander this imaginative genius was joined on the one side with the extremely practical statesmanship which made sound political organization attend immediately upon conquest, and on the other side with the strategical insight which patiently secured the whole eastern seaboard of the Mediterranean before it permitted an advance into the heart of Asia. And even beyond this we find Alexander giving the utmost effect to the tactical principles evolved by his greatest predecessors in the art of war and to the scientific conduct of siege operations almost without precedent. All this is obscured to most of us because our own imaginations are so much more impressed by certain of Alexander's picturesque aspects, his feats of personal daring, the traits of knightly chivalry or of human weakness and passion, which were so marked in his character, and the moral his life suggests concerning the vanity of human ambitions.

In the Middle Ages Alexander.

like many other heroes of antiquity, had acquired a highly mythical character, while his actual historical achievements were obscured. All manner of traditions and legends were transferred to him. The romance of Alexander, apparently first formulated in Egypt in the 2nd century A.D., popularised in a Greek version known as the work of the pseudo-Callisthenes, and latinised by Julius Valerius in the 3rd century, established itself as a predecessor of the Arthurian and Charlemagne legends. The most popular version is the 10th century work, *Historia de Proeliis*, attributed to one Leo of Naples. There were versions in every European language—while the Persians and Arabs had their own variations on the exploits of "Iskander." The Alexander of the romance is the conqueror of Western Asia, of India, of Africa, and incidentally of the Amazons and of Italy and Britain. He was son, not of his putative father Philip, but of an Egyptian wizard, Nectanebus. Medieval magic, enchanters, dragons, and so forth, enter largely into the legend.

*Bibliography.* Diodorus Siculus, *Bibliotheca Historica*, book XVII (c. 45–25 B.C.); Quintus Curtius (c. A.D. 42); Plutarch's *Life of Alexander the Great*, various translations, from Sir Thomas North, 1579, onwards; Lives, B. I. Wheeler, 1900; U. Wilcken, 1932; A. Weigall, 1933; F. A. Wright, 1934; W. W. Tarn (2 vols.), 1948.

**Alexander I (1777–1825).** Tsar of Russia. Son of the tsar, Paul I, and a German princess, he was born Dec. 23, 1777, and succeeded to the throne on his father's murder in 1801. He held liberal ideas, had a high sense of duty, and a conviction that monarchs were clothed



Alexander I.  
Tsar of Russia

with divine authority. Reversing his father's policy, Alexander made a convention with Great Britain, but sought also to act in concert with Napoleon, whom in reality he distrusted, and from whom he broke after the murder of the duc d'Enghien, 1804.

While Austrians and Russians were preparing for war Napoleon swooped down upon the Austrians at Ulm and shattered the combined armies, mainly Russian, at Austerlitz, Dec. 2, 1805. Next year, Oct. 14, Prussia was broken at Jena. Alexander gave an asylum to the Prussian king, but

after fighting two great battles at Eylau and Friedland he concluded in July, 1807, the treaty of Tilsit with Napoleon, in revenge for what he deemed the desertion of England and the futility of Austria. But he joined only half-heartedly in Napoleon's Continental System, directed against the admission of British goods into Europe. He saved Prussia from complete dismemberment by Napoleon, permitted rather than helped the overthrow of the Austrians at Wagram, July 5–6, 1809, turned a cold shoulder to Napoleon's proposals for marrying a Russian princess, and finally opened his ports to British commerce. War—Napoleon's disastrous Moscow adventure—followed in 1812. In 1813 Russia took a leading part in the uprising of Europe against the Napoleonic domination, which ended in 1814 with Napoleon's fall and his relegation to Elba.

Alexander now took the lead, supported by England, in securing liberal treatment for France and in organizing the Congress of Vienna for the settlement of Europe. The negotiations were interrupted by the Hundred Days, and after the final overthrow of Napoleon at Waterloo Alexander, with Wellington, resisted a vindictive policy towards France. But in the settlement of Europe Alexander's action was the curious product of two groups of ideas, which in existing conditions were wholly irreconcilable—his peculiar conception of autocracy and his sympathy with aspirations for liberty. By the latter he was moved to concede a constitution to his kingdom of Poland, while by the former he was led into creating the Holy Alliance.

This, however, reacted upon the tsar's domestic policy, destroying its old liberal character and making it repressive. So also in his later years, when Russians as well as British and French were watching with passionate sympathy the Greek struggle for independence, Alexander was found denouncing it as rebellion against legitimate authority. Yet to the last he cherished in his own mind the belief that he was a sincere champion of liberty. At the moment of his death, Dec. 1, 1825, a conspiracy had been formed against him which his brother, Nicholas I, had to suppress. See Holy Alliance; Vienna, Congress of.

*Bibliography.* Modern Europe, C. A. Fyffe, 1880–9; Revolutionary Europe, H. Morse Stephens, 1893; Modern Europe, W. Alison Phillips, 1901; History of Russia from the Birth of Peter the Great to the Death of Alexander II, W. R. Morfill, 1902.



**Alexander of Hillsborough,**  
ALBERT VICTOR ALEXANDER, VIS-  
COUNT (b. 1885). British politician.  
Born at Weston-super-Mare, May



Lord Alexander,  
British politician  
county education committee,

1, 1885, son  
of an artisan  
engineer, he  
was educated  
at Barton Hill  
elementary  
school, Bristol,  
and at tech-  
nical classes.  
He became  
a member of  
the staff of  
the Somerset

served in the army during the  
First Great War, and was for  
many years a Baptist lay preacher.  
He was Cooperative M.P. for the  
Hillsborough division of Sheffield  
1922-31 and 1935-50. First Lord  
of the Admiralty in the Labour  
government of 1929-31, in  
Churchill's coalition govt. of 1940-  
45, and again in the Labour  
government formed in 1945. In  
1946 he became minister without  
portfolio and was minister of  
Defence 1947-50, chancellor of the  
duchy of Lancaster, 1950-51.  
P.C. from 1929, he was made  
C.H. in 1941, and created a  
viscount in 1950.

## EARL ALEXANDER OF TUNIS

Maj.-Gen. Sir Charles Gwynn, K.C.B., D.S.O.

*This article reviews the career and achievements of a great British  
soldier. See also Burma Campaign; Dunkirk; Italy Campaign;  
North Africa Campaigns; Tunisia, Battle of; and biographies  
of Eisenhower and Montgomery*

✓ By common consent Harold  
Rupert Leofric George Alexander,  
Earl Alexander of Tunis, won a  
reputation unsurpassed by any  
general in the Second Great War. ✓  
One must go back to Wellington  
and Marlborough to find his equal  
among British generals of the  
past. An Irishman, like many  
other famous British soldiers,  
third son of the 4th earl of Caledon  
of Castle Caledon, Co. Tyrone, he  
was born Dec. 10, 1891, educated  
at Harrow and Sandhurst, and  
commissioned in the Irish Guards,  
Sept., 1911.

Still a junior subaltern, he went  
to France with his regiment in  
1914 and quickly made his mark  
as a leader of exceptional promise.  
Promotion came quickly, and  
during the last eighteen months  
of the war he commanded his  
battalion as an acting lieut.-col.  
Twice wounded, and five times  
mentioned in dispatches, he re-  
ceived the D.S.O. and M.C., and a  
brilliant career clearly lay ahead.

In 1919, specially employed with  
missions to Poland and Russia,  
for a year he commanded the  
Baltic Landswehr, thus gaining  
his first experience in command of  
foreign troops. Returning to  
England in 1922, he was promoted  
lieut.-col. at the exceptionally  
early age of 31. Having com-  
pleted his three years in command  
of his battalion, he then went  
as a student to the Staff  
College—a unique case—and al-  
though he graduated brilliantly,  
he asked at the end of his course  
to be employed on the staff in a  
lower grade than was due to his

rank, in order to gain experience  
of junior staff duties. This char-  
acteristic wish was met, but not  
until he had held a full colonel's  
appointment and had completed  
his military education at the Im-  
perial Defence College, where  
selected officers of the three fight-  
ing services and some civil ser-  
vants collaborate in the study of  
the concrete problems of combined  
staff work.

Having thus completed his  
military education, Alexander held  
staff appointments in England  
before going to India to command  
a brigade. There he gained  
experience of frontier mountain  
warfare, was awarded a C.S.I.,  
and made contact with Indian  
native troops. Promoted major-  
general at 46, he returned to  
England to command the 1st  
division at Aldershot—the most

coveted major-general's command  
in the army.

He took his division to France  
in 1939. That his powers of  
leadership inspired confidence was  
proved by his selection in May,  
1940, to take charge of the final  
stages of the evacuation from Dun-  
kirk. His coolness and imperturb-  
ability did much to sustain the  
morale of the troops in the ordeal  
on the beaches, and to see their  
general in his moments of relax-  
ation building sand castles calmed  
the nerves of men waiting for the  
next bomb or next boat.

Dunkirk was only the first  
of three "untidy" situations  
Alexander had to handle. The  
next was in Burma, whither he  
was rushed, now a general, in  
1942 to become G.O.C. of an out-  
numbered and shattered army.  
His extrication of this force from  
an apparently hopeless position by  
a fighting retreat from Rangoon  
to the mountains of the Indian  
frontier was an outstanding  
achievement.

Hardly had the retreat from  
Burma ended when his appoint-  
ment to be C.-in-C. Middle East  
called him to another untidy  
situation. Gen. Auchinleck, after  
the disaster in Libya, had halted  
Rommel's pursuit at Alamein,  
but it was a disorganized if not a  
demoralised army that stood to  
protect Alexandria. Winston S.  
Churchill judged that new blood  
was needed not only to carry  
through the urgently needed re-  
organization but also to restore  
the confidence of the troops.

Great as was Montgomery's part  
in the battles of Alamein, in the  
long pursuit, and in the battles of  
the Mareth line and the Akarit, it  
must be remembered that Alex-  
ander throughout was the respon-  
sible chief, and at Alamein was  
directly concerned in the planning  
and conduct of the battles.

By a decision taken at Casa-  
blanca, Jan., 1943, Alexander be-  
came deputy to Gen. Eisenhower  
as soon as the 8th army entered  
Tunisia; he assumed operational  
command of 18th army group (1st  
and 8th British armies, a U.S.  
corps, and a French contingent)  
Feb. 19, 1943. His intervention to  
retrieve a dangerous situation  
when Rommel, fighting his last  
African battle, counter-attacked  
the U.S. corps; his brilliant and  
bold planning and conduct of the  
final battles in the spring of  
1943, which inflicted humiliating  
and annihilating defeat on Sixt  
von Armin, confirmed his repu-  
tation as a commander in action.



Alexander

The early years of Alexandra's married life were fully taken up with domestic matters, but in 1868 she and the prince went abroad. After their return the princess began to take a more active part in the social life of the country of which she and her husband were, owing to Queen Victoria's secluded life, the leaders. Between 1871 and 1901 the princess of Wales fulfilled with remarkable success the duties of her high station. Her gracious manner and her real interest in the people made her popular everywhere.

In Jan., 1901, the prince succeeded to the throne, and Alexandra was crowned in Westminster Abbey as queen-consort by the archbishop of York, Aug. 9, 1902. As she had been as princess so she was as queen, and her charm and popularity remained unimpaired.



She did not often share the king's continental journeys, but she regularly visited Copenhagen, having always kept up the most friendly relations with her own kinsfolk; indeed, as her own home life showed, she possessed the domestic virtues to an unusual extent. In 1910 Edward VII died, and Alexandra, thereafter known officially as the queen-mother, returned to Marlborough House and received an annual income of £70,000. She died Nov. 20, 1925, and was buried beside King Edward in St. George's Chapel, Windsor. Over £230,000 was raised as a national memorial to her, and this was expended on the development of district nursing, the provision of pensions for queen's nurses, and the erection of

a statuary group in bronze outside Marlborough House. *Consult* Queen Alexandra, Sir G. Arthur, 1934.

**Alexandra** (1872-1918). Tsaritsa of Russia. Born June 6, 1872, she was the daughter of Louis IV, grand duke of Hesse, and a granddaughter of Queen Victoria. She changed her name from Alix to Alexandra Feodorovna at her marriage on Nov. 14, 1894, her husband having become Tsar Nicholas II a few days previously. A powerful and determined character, she dominated her husband with her reactionary views, but was herself under the influence of Rasputin (*q.v.*) from 1907, being frequently in a state of exaltation in which she sought the guidance of Providence. She continually interfered in the choice of ministers until Rasputin was murdered at the end of 1916.

When the tsar abdicated on March 15, 1917, Alexandra went with him, and at Ekaterinburg (now Sverdlovsk), July 16, 1918, she was shot with him and their son and four daughters. *Consult* Letters of the Empress Alexandra Feodorovna to the Emperor Nicholas II, 1932: The Real Tsaritsa, by Lili Dehu, 1922.

**Alexandra OF KENT** (b. 1936). British princess, only daughter of George, 1st duke of Kent (1902-1942), and Marina, duchess of Kent. Born on Christmas Day, 1936, the second child of her parents, she was baptized Alexandra Helen Elizabeth Olga Christabel.

**Alexandra Day** OR ROSE DAY. Observed towards the end of every June, and named in honour of Queen Alexandra. It was first celebrated in 1912, the 50th year of Queen Alexandra's residence in England. Artificial roses, made by the blind and crippled, are sold in the streets, the profits being distributed among hospitals, convalescent homes, and kindred institutions. In 1944 the total raised was a record sum of £185,000.

**Alexandra Palace.** London place of amusement. Situated on a ridge at Muswell Hill, Wood Green, Middlesex, 6 m. N. of Charing Cross, it was opened May 1, 1875. It occupies about 7 acres. The Grand Hall, containing a fine organ, seats 12,000 persons and the orchestra 2,000, while the concert hall can accommodate 3,500 and the theatre 3,000. The palace, named after Queen Alexandra, is the second of its name. The first, opened May 24, 1873, was entirely gutted by fire on June

9 following. After being closed for some time the present structure and land were bought for £150,120 by the Middlesex and other county councils, and opened free to the public May 18, 1901. During the First Great War the palace was used for the internment of German prisoners, and since then the buildings had fallen into some neglect, until the B.B.C. opened television studios there in

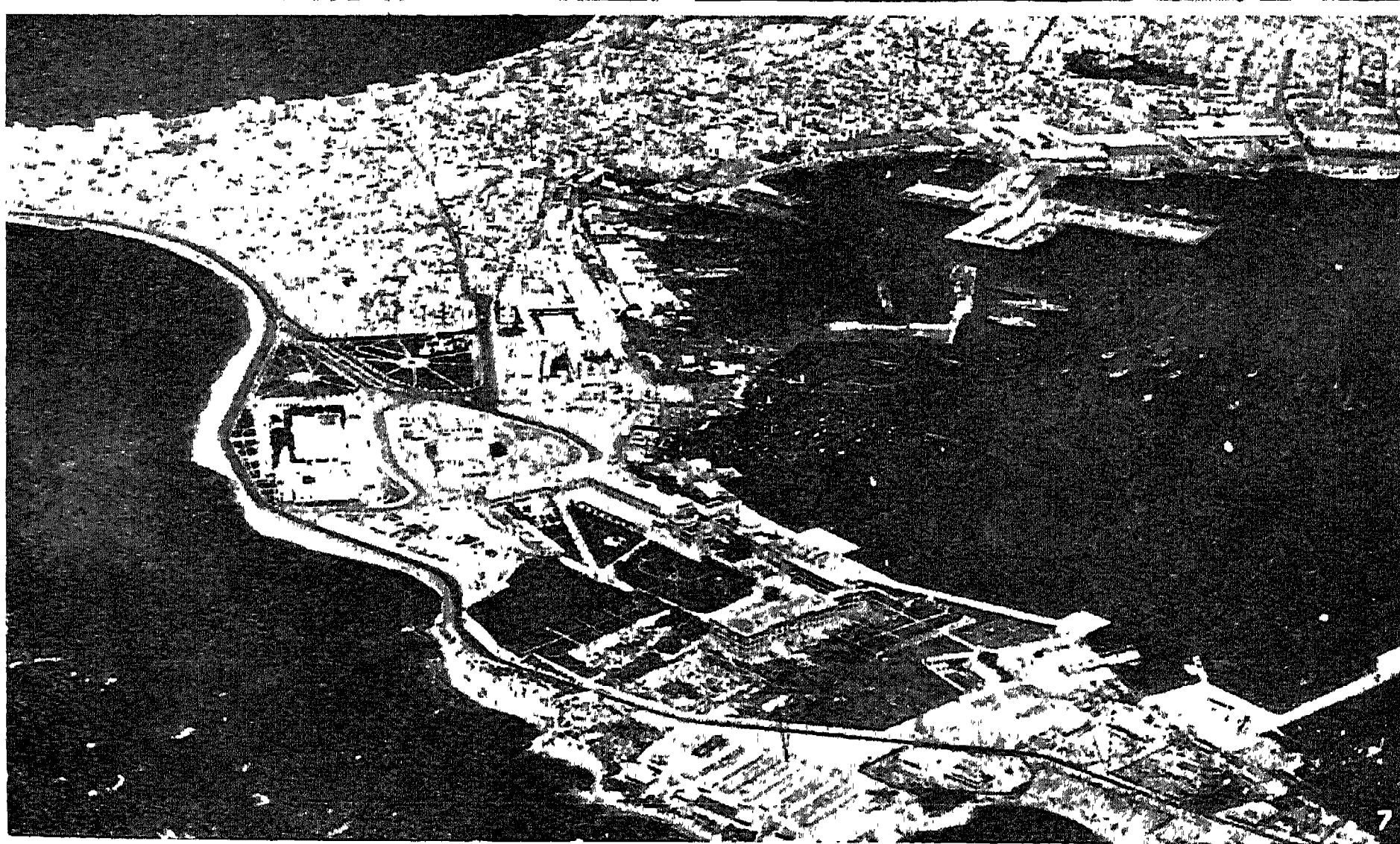
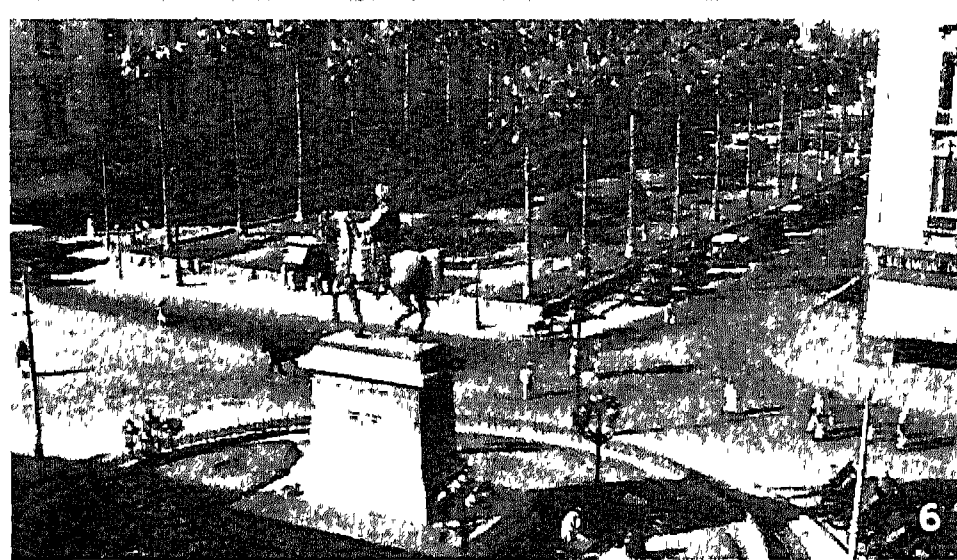
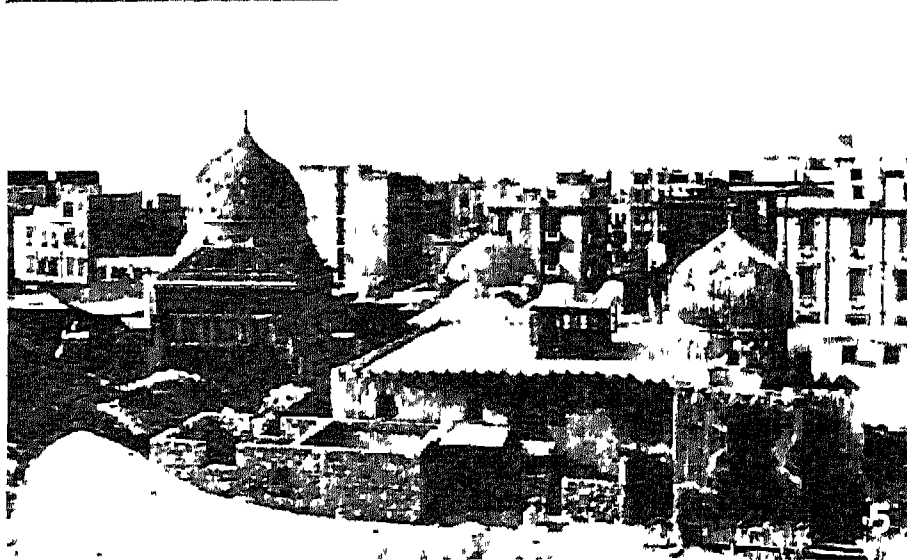
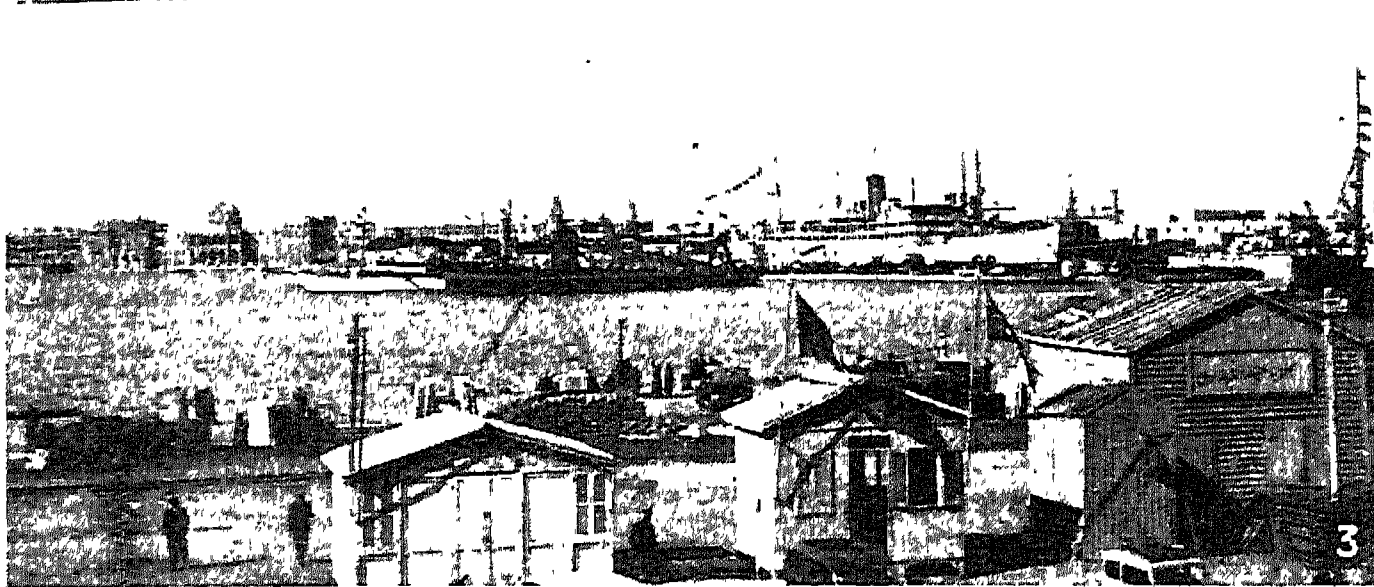
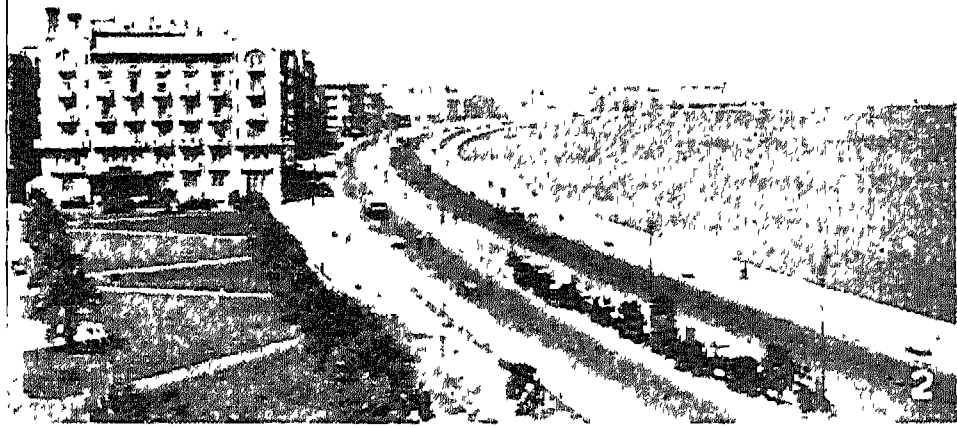


Alexandra Palace. Aerial of television transmitter of 1939 on N.E. corner tower

1936. A television transmitter aerial 220 ft. high was added to the N.E. tower. The park, in which a racecourse is laid out, covers 480 acres.

**Alexandretta.** Seaport of Turkey, in the vilayet of Hatay. It is known also as Skanderoon, from its Turkish name of Iskanderun, and lies on the E. shore of the Gulf of Alexandretta, at the extreme N.E. of the Mediterranean. The terminus of a branch line of the Adana-Aleppo Rly., it is about 70 m. N.W. of Aleppo. Anciently called Alexandria ad Issum, it was founded by Alexander the Great to commemorate his victory at the Issus, 333 B.C. Here Sir Kenelm Digby defeated a Franco-Venetian force in 1628 and Mehemet Ali won a victory over the Turks in 1832. In the First Great War it was occupied by British and French troops, Nov. 9, 1918. It is the port for Aleppo (*q.v.*), has a fair harbour, exports wool, leather, hides, nuts, silk, and copper in considerable quantities, and is a busy commercial centre. After the Turkish collapse in 1918 Alexandretta was included in the Syrian republic, and in 1937 became an autonomous sanjak, the name being officially changed to Hatay in 1938. But in 1939 the sanjak was formally returned to Turkey. Pop. (1950) 22,946. The Gulf of Alexandretta is a N.E. arm of the Mediterranean.





1. Mehemet Ali Square; at the far end is the Exchange.  
2. Queen Nazli Avenue, with Obelisk Square on the left.  
3. View of the port showing large mail steamers at the quays and one of the royal palaces on the left.  
4. Minaret in the bazaar quarter.  
5. Nebi Daniel

mosque.  
6. Statue of Mehemet Ali (1769-1849), governor of the Sudan; beyond is Saad Zaghlul Square.  
7. Air view, right, of the modern western harbour, sheltered by a two-mile breakwater; top left, the old eastern harbour, turned over to fishing boats

# **ALEXANDRIA : BLEND OF OLD AND NEW IN EGYPT'S GREAT MEDITERRANEAN PORT**

the reign of Theodosius the Great the temple of Serapis was sacked in A.D. 391 by a mob of fanatical Christians urged on by Bishop Theophilus.

Connected with the Brucheion library was the Museum, a kind of academy, where a number of learned men, whose duty it was to see to the arrangement, cataloguing, and general improvement of the MSS., were housed at the royal expense. The most famous librarians were Zenodotus of Ephesus (280 B.C.), the Apollonius Rhodius (c. 260 B.C.), the Homeric scholar Eratosthenes (c. 234 B.C.), Aristophanes of Byzantium (c. 195 B.C.), and Aristarchus (c. 180 B.C.). These and succeeding librarians drew up for the benefit of students the Alexandrian canon—lists of authors considered the best representative models of different classes of literature.

**Alexandria Downs** CATTLE STATION. Cattle ranch said to be the largest in the world. It lies on the Barkly Tableland. Northern Territory, Australia. Area c. 13,000 sq.m.

**Alexandrina.** Lake of South Australia. At the outlet of the Murray river, 60 m. S.E. of Adelaide, it was discovered by Charles Sturt (1795–1869) in 1830 and named by him after Princess Alexandrina, afterwards Queen Victoria.

**Alexandrine.** Standard metre of French verse. It is a line of twelve syllables. First used in the 12th-century French poem, *Le Pèlerinage de Charlemagne à Jérusalem*, it may derive its name from another early poem, *Le Roman d'Alexandre*. Little used thereafter until the 16th century, it was then re-established by the *Pléiade* (q.v.). By the 17th century it had become the standard metre of French verse, with pairs of masculine Alexandrines alternating with pairs of feminine ones (i.e. those ending with a mute syllable). The classical Alexandrine has the caesura after the sixth syllable.

In English verse another name for the Alexandrine is the iambic hexameter. Drayton's *Poly-Olbion* is written entirely in Alexandrines. A familiar instance occurs in Pope's criticism of trite verse :

A needless Alexandrine ends' the song,  
That, like a wounded snake, drags  
its slow length along.

**Alexandrite.** Dark green variety of chrysoberyl. It is found in the Ural Mountains and is prized as a gem-stone because the light transmitted in one direction is red.

**Alexandropol.** Older name of Leninakan (q.v.).

**Alexandrovsk.** Older name of (i) Zaporozhe (q.v.), Ukraine S.S.R.; (ii) Polyarny (q.v.) R.S.F.S.R.

**Alexandrovsk - Grushevsk.** Older name of Shakhty (q.v.).

**Alexeiev, MICHAÏL VASSILIEVICH** (1857–1918). Russian soldier. The son of a private soldier, he fought in the Russo-Turkish war of 1877–78, then entered a military academy, gradually rising in rank by sheer merit. He was quartermaster-general in Manchuria during the Russo-Japanese War, 1904–05, and became chief of staff to the Russian 3rd army after the battle of Mukden. At the beginning of the First Great War he was chief of staff to Gen. Ivanov, then commanding the Russian armies of the S.W. When in 1915 the tsar became commander-in-chief, Alexeiev became chief of staff and the real generalissimo. After the revolution of March, 1917, he was chief of staff to Kerensky; but when Lenin and Trotsky came to power in Nov. (Oct. O.S.), he retired to the Kuban and helped to organize the

volunteer army to fight the Bolsheviks. On Sept. 25, 1918, he died of pneumonia at Ekaterinodar (Krasnodar).

**Alexei Mikhailovich** (1629–1676). Tsar of Russia. Son of Tsar Michael, the first of the Romanovs, whom he succeeded in 1645, he was at war with Poland,

1654–67, and with Sweden, 1656–61. Smolensk and Kiev, with the territory E. of the Dnieper, were added to Russia by the Polish war. He had 15 children, of whom Peter the Great, his son by his second wife, was the youngest but one.

**Alexei Petrovich** (1690–1718). Eldest son of Peter the Great. A student from boyhood, of weak will and pious inclinations, he was entirely out of sympathy with his father's plans and activities, and in turn was despised and hated by Peter. In 1717 he fled to the emperor Charles VI at Vienna, and

Charles sent him for safety to Naples. Persuaded to return by a promise of pardon, he reached Moscow Jan. 31, 1718. Instead of being pardoned, he was imprisoned at St. Petersburg and knouted June 19 and 24. He died June 26, 1718. He married Charlotte of Brunswick and left a son, who became Peter II (q.v.).

**Alexius I Comnenus** (1048–1118). East Roman Emperor 1081–1118, second member of the Paphlagonian family of Comnenus (q.v.) to achieve that title. Elevated to the throne by a military revolution, he was confronted with serious dangers. In the west, the Normans landed in Epirus and besieged Dyrrachium. By valuable trading concessions Alexius secured the aid of Venice, and the Normans were checked by two naval defeats. In the north, marauding Petchenegs and Turkish Kumans crossed the Danube but were beaten in 1091 and 1094 respectively. In the east, the Seljuk Turks had founded a kingdom in Asia Minor.

Knowing the desire of Rome for a reconciliation with Constantinople, Alexius appealed to Pope Urban II for aid against the common enemy, Islam. The result was the first crusade and French victories over the Turks in Asia. Bohemund, leader of the Normans, made himself independent ruler of Antioch in 1098 and again attacked Epirus; but Alexius's superior strategy forced him to sue for peace; and the defeat of the Seljuks in 1116 recovered the western half of Asia Minor for the empire. The end of Alexius's life was embittered by domestic quarrels concerning the succession. He died Aug. (?) 11, 1118. A most capable ruler, he postponed the fall of the empire for almost a century.

**Aleyard** OR YARD OF ALE. Old English drinking-glass, a yard or more long, holding a pint or more. It was

usually trumpet-shaped, rather like a coach horn. Sometimes it ended in a hollow ball; when the air reached the inside of the ball the liquor spurted over the drinker. Drinking a yard of ale at one draught was a popular feat. The glass shown here holds two pints.



Alexei Petrovich, son of Peter the Great, from an engraving after Dinglinger



Aleyard. This old English drinking-glass alongside a ½-pint tumbler



Testament, 1849-61, Alford is best known as the author of *The Queen's English*, 1864, and as the writer of several hymns, *e.g.* Ten thousand times ten thousand; Come, ye thankful people, come. He edited the *Contemporary Review*.

**Alfred.** A masculine Christian name very popular in England, largely because it was borne by Alfred the Great. Of Anglo-Saxon origin, it means wise in counsel. The almost obsolete Alured is a variant.

**Alfred the Great (849-901).** English king. A younger son of Ethelwulf, the successor of Egbert, king of Wessex, Kent, and Essex, and overlord of the other English kingdoms, and his first wife Osburga, he was born at Wantage, in Berkshire, and in childhood was taken by his father to Rome. According to Alfred himself and Bishop Asser, his friend, contemporary, and biographer, he could not read until he was twelve. Alfred's three elder brothers all reigned in succession after Ethelwulf, the third, Ethelred, becoming king in 866.

For thirty years past Danish marauders had periodically flung themselves upon the E. and S. of England. In 866 they descended upon East Anglia, and in 867 made themselves masters of Northumbria. In 868 they attacked Mercia, but Ethelred and his young brother led an army to

the help of the Mercians. Neither Danes nor English could win a decisive victory, but the Danes agreed to accept an indemnity or ransom and retire from Mercia. In 871 they invaded Wessex in

Wedmore with stricter definitions and guarantees under the compact known as Guthrum's Fryth. Guthrum's own authority, however, only extended over Essex and East Anglia. In 892 a Danish

host under the Viking Hasting descended upon Wessex. But Alfred had mastered all the devices which had given the Danish hosts their ascendancy. He built ships like those of the Danes, only bigger; taught his men to fortify and hold entrenched positions, trained them to keep the field instead of dispersing as soon as they had inflicted a defeat upon the enemy. The Danes were so soundly beaten that from 896 until his death on (probably) Oct. 28, 901, Alfred was molested no more.

Alfred's genius as a military organizer, even more than his brilliant leadership, rescued half England from Danish conquest,



Alfred the Great. The hull in this representation of Noah's Ark from the Caedmon MS., is typical of the warships of Alfred's day

*By permission of the British Academy*

force, and were defeated at Assandune, mainly by the skill and valour of Alfred; but two months later the Danes more than held their own in another great fight at Merton. A few days after the battle of Merton, Ethelred died and Alfred succeeded.

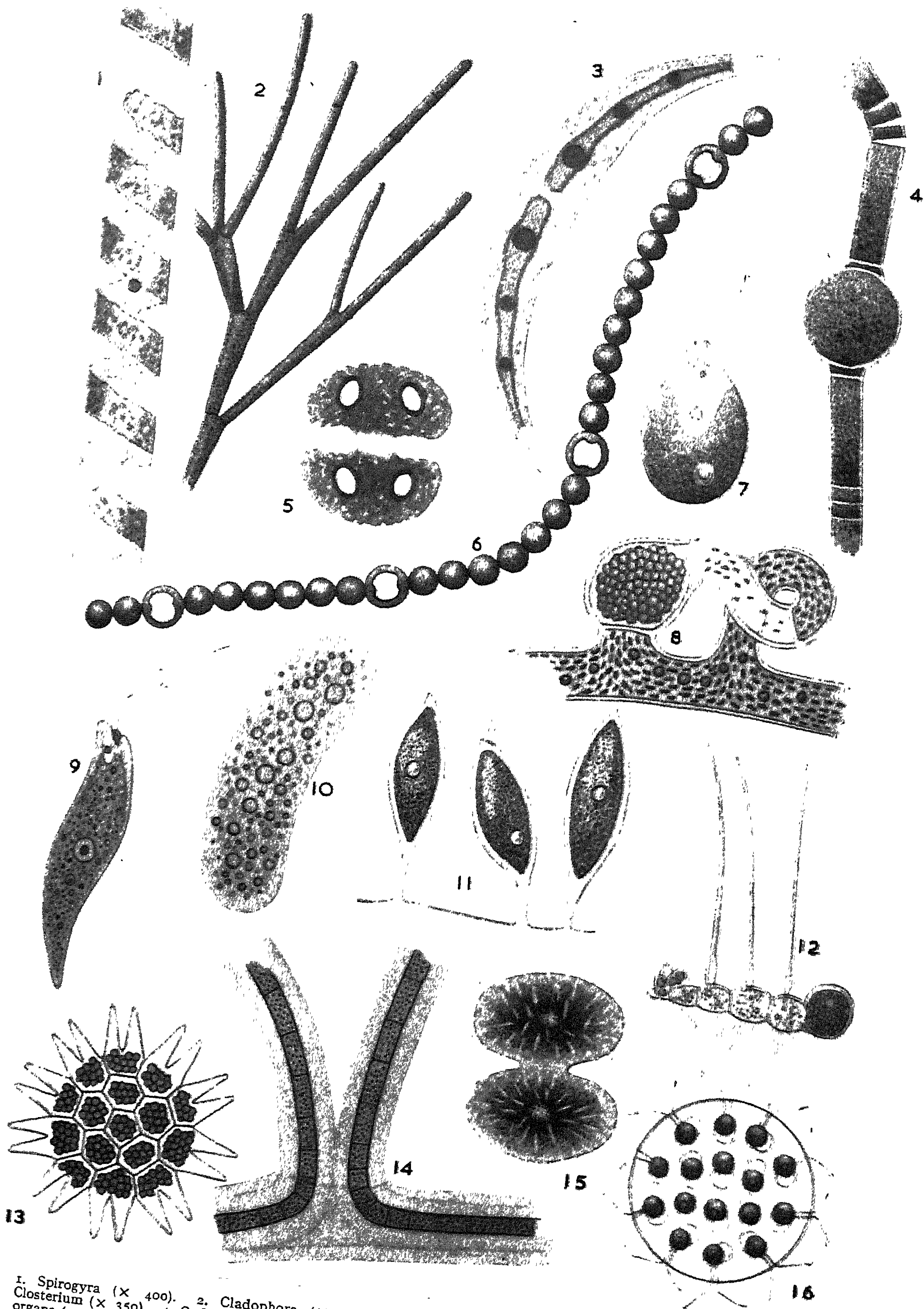
Until 875 Alfred was left in peace. He used the time in organizing the English for war and in laying the foundations of a fleet, while the Danes consolidated their dominion over East Anglia, Northumbria, and the north of Mercia. In 876 they invaded Wessex once more, and at the beginning of 878 Alfred, with only a few followers, was driven into retreat in the isle of Athelney, in Somersetshire, an episode in his career to which belongs the story of the burnt cakes. Yet in May the English forces had been again so reorganized that Alfred was able to lead them to a great victory at Ethandune. This was decisive. The Danes had learnt to respect their foe's courage and resource, and their chief Guthrum agreed to the compact known as the treaty of Chippenham or Wedmore (May, 878), and, with several followers, received baptism. Another Danish irruption in 884 resulted again in victory for Alfred and the renewal of the treaty of

and prepared the way for the recovery of English supremacy from the Channel to the Tyne. He was no less great as an administrator. He codified the varying laws and customs of his kingdom, modifying and coordinating them into the code known as the dooms of King Alfred. His dooms may be regarded as the real foundation of the common law of England, though he created nothing that had any resemblance to trial by jury, popularly attributed to him. He imbued his people with a new sense of unity, a national instead of a merely local spirit.

Hardly less remarkable were his efforts and achievements in the direction of education, though he did not, as tradition asserts, found the university of Oxford. He organized the teaching of the young, summoning foreign scholars to his aid. He translated from Latin into Anglo-Saxon the standard works of his time on philosophy and history, such as the *Consolations of Philosophy*, by Boetius (*q.v.*), the *History of Orosius*, and the *Ecclesiastical History of Bede*. He instituted and placed in competent hands that continuous contemporary survey of events, still used as a basis by all students of Anglo-Saxon language and history,



Alfred the Great. Penny struck to commemorate his capture of London



1. Spirogyra ( $\times 400$ ). 2. Cladophora ( $\times 60$ ). 3. Closterium ( $\times 350$ ). 4. Oedogonium, with reproductive organs ( $\times 440$ ). 5. Cosmarium ( $\times 480$ ). 6. Anabaena ( $\times 960$ ). 7. Chlamydomonas ( $\times 1,180$ ). 8. Reproductive organs of Vaucheria ( $\times 220$ ). 9. Euglena ( $\times 400$ ).

10. Mesothenium ( $\times 580$ ). 11. Characium ( $\times 1,040$ ) and 12. Aphanochaete ( $\times 430$ ) both growing epiphytically on a filamentous alga. 13. Pedicellum ( $\times 930$ ). 14. Scytonema ( $\times 400$ ) showing false branching. 15. Staurastrum ( $\times 365$ ). 16. Eudorina ( $\times 640$ ).

**A GROUP OF MICROSCOPIC ALGAE ILLUSTRATING THEIR WIDE RANGE OF FORM**



of Faro (*q.v.*). It is mountainous on the northern border and in the E. and W., but fertile and well cultivated in the S. Large quantities of fruit are grown and there is fishing, based on several small harbours in the S. The smallest province, it was conquered by Alphonso III from the Moors in 1253. The capital is Faro. Area 1,937 sq. m. Pop. (1950) 325,971.

**Algebra.** A branch of mathematics which may be defined as generalised arithmetic. In the first instance it is no more than a device designed to allow problems involving numbers to be formulated and solved by reasoning of a more or less symbolical nature. The earliest recorded example of algebraic method is contained in the Rhind papyrus, dated about 1700 B.C., in which the scribe Ahmes describes step by step what is effectively the solution of a simple equation. The argument involves no use of symbols for "unknowns" and there is no indication of any realization that the method is applicable to a definable class of problem (the notion of a simple equation was still thousands of years off); but the argument, if put into modern terminology and notation, would follow the lines laid down for the solution of such problems in the elementary textbooks of algebra.

The word algebra is to be found first in the title of a work of the Muslim mathematician al-Khwarizmi who lived in the early 9th century; the Arabic *al-jabr* means the putting together. Long before that, algebra had been studied unsystematically by the Egyptians and Sumerians and abandoned by the Greek mathematicians in favour of geometry. The Greeks identified number with length, and multiplication of numbers with the area of rectangles of given length and breadth. This subordination of arithmetic and algebra to geometry, strange to a modern mind, was directly related to the Greeks' passionate devotion to form as the supreme manifestation of order and beauty in the universe. "God ever geometrises," said Plato, more than 2,000 years before Kronecker revised this to "God ever arithmetises." The Greek attitude served as a powerful check on the development of mathematics; not only was algebra neglected, but no attempt at a rational notation for arithmetic was made. It was not until A.D. 350 that the Alexandrian mathematician Diophantus wrote the first systematic treatise on algebra.

An essential rôle in the development of algebra has been played by the invention of satisfactory notations for expressing arithmetical ideas. The positional notation for numbers, the  $+$ ,  $-$ ,  $\times$ ,  $\div$  symbols of elementary arithmetic, the symbol 0 for the zero number (of course, the recognition that 0 is a number was a sublime advance in human thought), the symbols for fractions, and the introduction of the symbol  $=$  for equality, have all contributed decisively to the development of algebra and arithmetic.

To the non-mathematician, the most significant feature of algebra as taught in schools today is the use of letters of the alphabet to stand for numbers. This should be thought of as a supremely convenient notational device designed to allow general statements about numbers to be made, and to allow the laws of arithmetic to be expressed without appeal to long-winded verbiage. Thus the fact that the result of adding two numbers together is independent of their order may be expressed symbolically by writing

$$x + y = y + x.$$

Here  $x$ ,  $y$  stand for any two numbers, and we obtain true statements by substituting arbitrary "values" for  $x$ ,  $y$ ; *e.g.*

$$\begin{aligned} 2 + 6 &= 6 + 2; \\ (-7) + \frac{5}{4} &= \frac{5}{4} + (-7). \end{aligned}$$

Thus algebra appears as a convenient notation, and it turns out to be of enormous advantage in carrying out quantitative reasoning. Suppose it is required to find a number with the property that five times the number smaller by two than the given number is greater by four than three times the given number. A considerable mental effort is involved in understanding the problem in verbal form, and the solution presents formidable difficulties unless algebraic notation is used. If we represent the number to be found by  $x$ , the statement becomes

$$5(x-2) = 3x + 4;$$

from which we deduce successively:

$$\begin{aligned} 5x - 10 &= 3x + 4, \\ 5x - 3x &= 10 + 4, \\ 2x &= 14, \\ x &= 7. \end{aligned}$$

We verify that the number 7 does, in fact, satisfy the given condition. The reasoning throughout is formal and, what is of fundamental importance, systematic. The problem is translated into the equation  $5(x-2) = 3x + 4$ , which is then solved by the successive steps

of clearing brackets, collecting the terms involving  $x$  on one side of the equation and the terms not involving  $x$  on the other, and dividing by the coefficient of  $x$ .

Any equation involving  $x$  and no higher powers (called a simple or linear equation) can be solved in this way, and the algebraic method leads to the classification of problems by the type of equation to which they lead. In this way standard methods may be developed for solving classes of problems, and algebra may be regarded as the systematisation of quantitative reasoning.

A quantitative problem is solved algebraically in four steps: (1) the problem is translated into algebraic language; (2) the algebraic statement is recognized as belonging to a certain class (*e.g.* a simple equation); (3) the appropriate solution, if known, is applied; (4) the result is interpreted. As a further example, suppose we are told that the square of a boy's age exceeds twice his age by 35 years. If he is  $x$  years old, we have  $x^2 = 2x + 35$ . By the method of solution of quadratic equations we find  $x = 7$  or  $-5$ . We reject the solution  $x = -5$  because  $-5$  is not a legitimate number to represent a boy's age, and deduce that he is 7 years old. This example demonstrates the importance of the final step of interpretation; we could re-state this point by saying that the implicit conditions of this problem require that  $x$  be positive.

The fundamental rôle played by algebra in the solution of actual problems easily justifies the study of algebra in its own right, and the manipulation of algebraic symbols is seen as an essential tool in quantitative argument. For example, we may wish to simplify the expression

$$\frac{5}{3x-6} - \frac{8}{5x-10}$$

By standard techniques we can show that

$$\begin{aligned} \frac{5}{3x-6} - \frac{8}{5x-10} &= \frac{5 \times 5 - 8 \times 3}{(3 \times 5)(x-2)} \\ &= \frac{1}{15(x-2)} \end{aligned}$$

It should be emphasised that the "equals" sign has a different meaning in this example from what it has in an equation. Here it expresses an identity, *i.e.* a statement which is true whatever numbers are substituted for  $x$  (provided the expressions make sense after the substitution: thus we

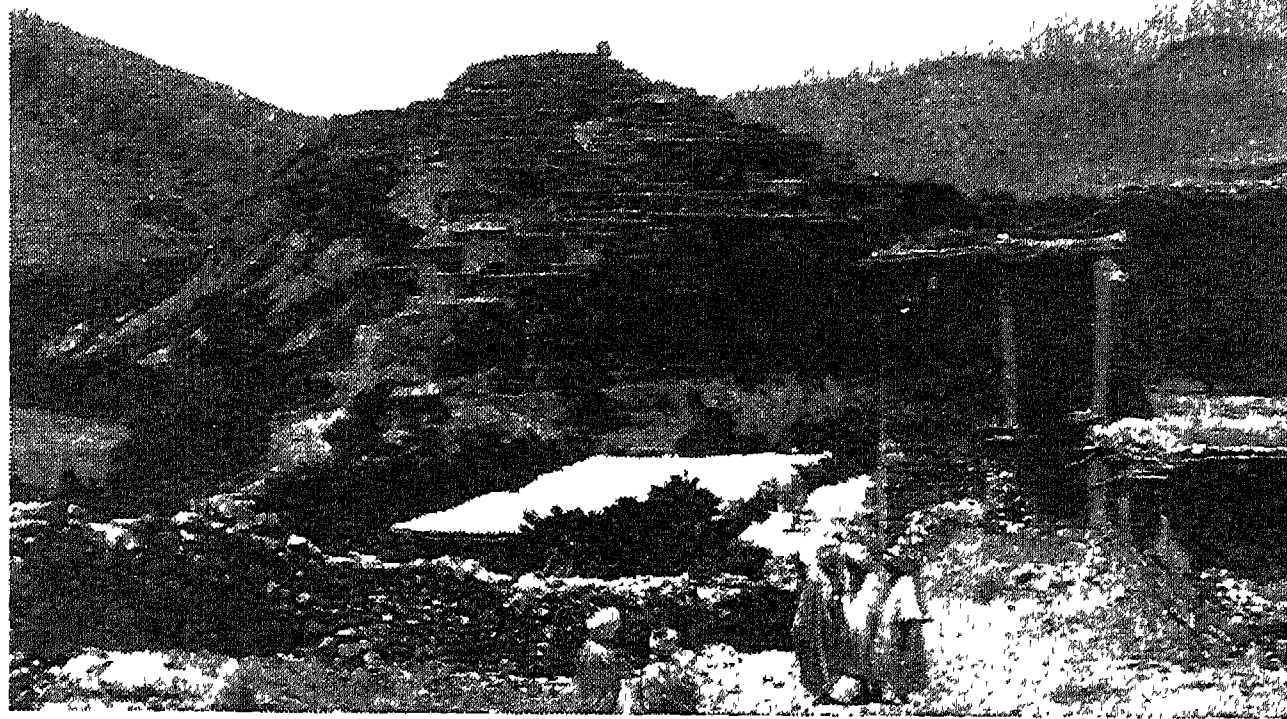
fractions, say  $a=r/s$ ,  $b=p/q$ , then  $a^b$  satisfies the equation  $s^p x^q = r^p$ . On the other hand it can be shown that  $\pi$  is not algebraic. Roots of polynomial equations with integer coefficients and with the leading coefficient unity are called algebraic integers. It can be shown that the set of all algebraic numbers forms a field. The terms algebraic number, algebraic integer may be extended to roots of polynomials with coefficients in any integral domain.

**Algebraic Varieties.** An algebraic curve is a curve which may be represented in a given coordinate system by algebraic equations between the coordinates: the parabola  $y=x^2$  is an algebraic curve, but the sine curve  $y=\sin x$  is not; it is transcendental.

Similarly, in three dimensions, algebraic surfaces are represented by algebraic equations: so that the sphere  $x^2+y^2+z^2=a^2$  is an algebraic surface, whereas the surface  $z=\log(x^2+y^2)$  is not.

These ideas, generalised to higher dimensions, are called algebraic varieties. In general, an algebraic variety of dimension  $n$  in space of  $m$  dimensions would be given by  $m-n$  algebraic equations which satisfy a condition of algebraic independence. The study of algebraic varieties in projective, affine, or euclidean space is called algebraic geometry.

**Algeciras.** Seaport and winter resort of southern Spain, in Cadiz province. It stands on the W. side of the bay of Algeciras, 6 m. W. of Gibraltar. The harbour is not naturally good, but has been improved by artificial works. Oranges, charcoal, and leather are exported. Whale fisheries, operating off Algeciras, were started in 1923 with the help of Norwegian capital. The old town was



Algeria. Kabyle village among the mountains. The Kabyles, or Berber people, inhabited Algeria, Morocco, and Tunisia before the Arab conquest of the 8th century

founded by the Moors in 713; the modern town dates from the 18th century. Pop. 20,500.

In 1801 Sir James Saumarez fought two battles in the bay against a Franco-Spanish fleet, losing the first on July 6 and completely defeating the enemy in the second on July 12.

**Algeciras, CONVENTION OF.** Agreement signed in 1906 regulating the affairs of Morocco. In 1904 Great Britain and Spain had agreed to allow France a free hand in Morocco. Germany refused to recognize this agreement, contending that it was contrary to the Madrid convention of 1880, which gave equal rights to all the signatory powers.

Encouraged by German support, including the celebrated visit of the Emperor William II to Tangier in March, 1905, the sultan of Morocco refused to agree to reforms urged on him by France, and suggested a conference, which met at Algeciras Jan. 16, 1906. Most of the European Powers and the

U.S.A. were represented, Spain acting as host and president. Only Austria supported Germany, and on April 7 the convention, which admitted the privileged position of France, was signed. The reforms indicated were accepted by the sultan; they provided for the improvement of the Moroccan administration, especially as regards finance and law and order, and regulated foreign trading rights.

**Algeria** (Fr. Algérie). A country of North Africa. Extending for 650 m. from E. to W., Algeria is bounded on the N. by the Mediterranean Sea, on the W. by Morocco, on the E. by Tunisia, and indeterminately to the S. by the Sahara. Along the coast lie the three departments of Algiers, Oran, and Constantine; to the south are the four territories of Aïn Sefra, Ghardaïa, Tougourt, and the Saharan oases (see below). Area, est., 847,500 sq. m.

The Atlas Mts., running roughly parallel with the coast, determine the configuration of the land. They consist of two series of chains, the Little, or Tell, Atlas to the N., and the Great, or Saharan, Atlas to the S., and form a broad belt of highlands, tablelands, and ravines, their highest summit under 8,000 ft., and separate the coastal region of undulating cultivated land called the Tell from the desert region of the Algerian Sahara. This inland area, sometimes called the high plateaux, includes the area of depression which contains the Shotts—saline, marshy, desolate tracts—and in the E. the area of the forested Jebel Aurès, which is high enough to be rainy and contains many very fertile valleys. The centres of population in the Saharan area are the oases. N. of the Tell, on the seaboard, are several separate groups of hills.

The rivers of Algeria are short and useless for navigation. They rise in the tablelands of the S. and cross the plain northward to the sea, forming winding, shallow water-courses, which in summer are little more than stony tracks. The Cheliff, or Shelif, 425 m. long, is the longest and most important. It rises in the N. declivity of the Jebel Amur. The two rivers next



Algeciras. The church of Santa Maria de la Palma, built 1738, in this port and winter resort of Spain





1. Notre Dame d'Afrique, founded 1872; it is to the N.W. of Algiers. 2. The arch of Trajan, at Timgad. 3. Two girls of the Ouled-Nail tribe, from which dancers are recruited. 4. Artesian well and garden at the

*French Government Tourist Office, London*  
military post of El Golea. 5. A street in the Kasba, Arab quarter of Algiers. 6. A well at the oasis of Ghardaia. 7. The Ouled Abdi where it flows under an ancient fort in the Aures Mts. 8. Panorama at Tougourt

**ALGERIA : SCENES AND PEOPLE IN THIS COUNTRY OF NORTH AFRICA**



harbour dating from 1518, and consisting of a mole running out to a rocky islet, on which the lighthouse stands; and an outer harbour, begun in 1836, enclosed by three jetties on the N., S., and E. The city has an airport and rly. connexion with all the principal towns of Algeria. A cable car service, the first in N. Africa, was opened between Algiers and Belcourt in 1956. Algiers has an important external trade, chiefly with France, exporting fruits and vegetables, olive oil, cereals, and tobacco, and importing French goods, and coal, iron, and cotton from Great Britain.

Algiers is rich in vestiges of Roman, Christian, and Moorish civilization, which are constantly coming to light; their preservation and study are fostered by the French authorities. Pop. (1948) 315,210; including the suburbs, 480,150.

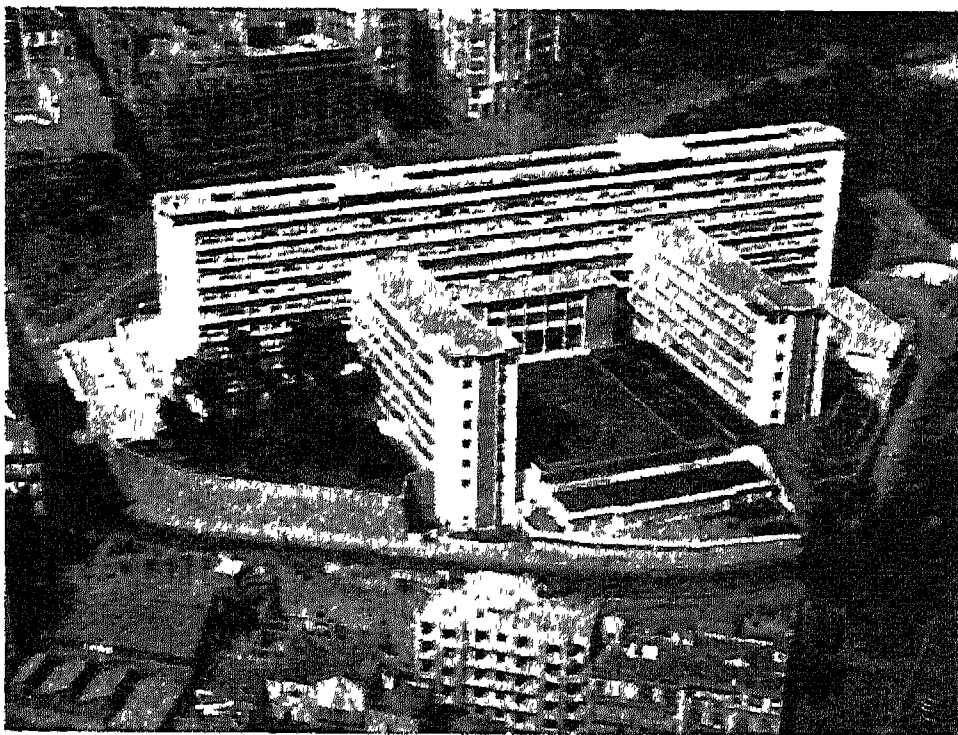
**HISTORY.** Algiers was founded c. 935 by the Arabian prince Zeiri whose successors ruled Algeria until the 12th century, being succeeded by the Almohades. Algiers then became independent, and many Jews and Moors driven from Europe found refuge there, and set up with Turkish help a regime of piracy and insolent military despotism that remained a menace to peaceful Mediterranean trading by European countries until 1830. The town was occupied by the Spaniards for a brief period after its seizure by Ferdinand V, king of Spain, in 1509, and was stormed by a combined British and Dutch squadron under Lord Exmouth in 1816; but it was not until after its capitulation to the French in 1830 that it became the seat of ordered government. During 1943-44, Algiers was the French capital (see Gaulle, Charles de; Giraud, Henri; North Africa Campaigns).

**Alginic Acid.** A complex polysaccharide; its molecules are long chains of *D*-mannuronic acid units linked in a specific manner. It is found in the brown algae, from which it is extracted on a commercial scale. The colloidal pro-



Algiers. General view of the water-front of this North African port, the capital of Algeria, seen from the lighthouse jetty

perties of its sodium salt, algin, make it a valuable adjunct for the food industry, where it is used as a thickening and stabilising agent for emulsions, and as a basis for sterile "synthetic" sausage and other casings. It has analogous uses in the making of paper, textiles, and pharmaceutical goods. Its most important property for these industries is the high viscosity or "thickness" of the sodium salt when it has been dissolved in water.



Algiers. Government Building in the Boulevard Foch, h.q. of the French Administration for North Africa

**Algoa Bay.** Wide roadstead of South Africa some 440 m. to the E. of Table Bay. Port Elizabeth extends 6 m. along its shores; before its quays were constructed ships lay in the open roadstead.

**Algol.** Double star charted as  $\beta$  Persei. It was called by the ancient astronomers the demon star (Arabic *al-ghul*, the demon) because of the malevolence of its winking eye, a phenomenon of varying brightness now ascribed to the revolution of a dark star about a bright one. Algol gives its name to a small class of variable

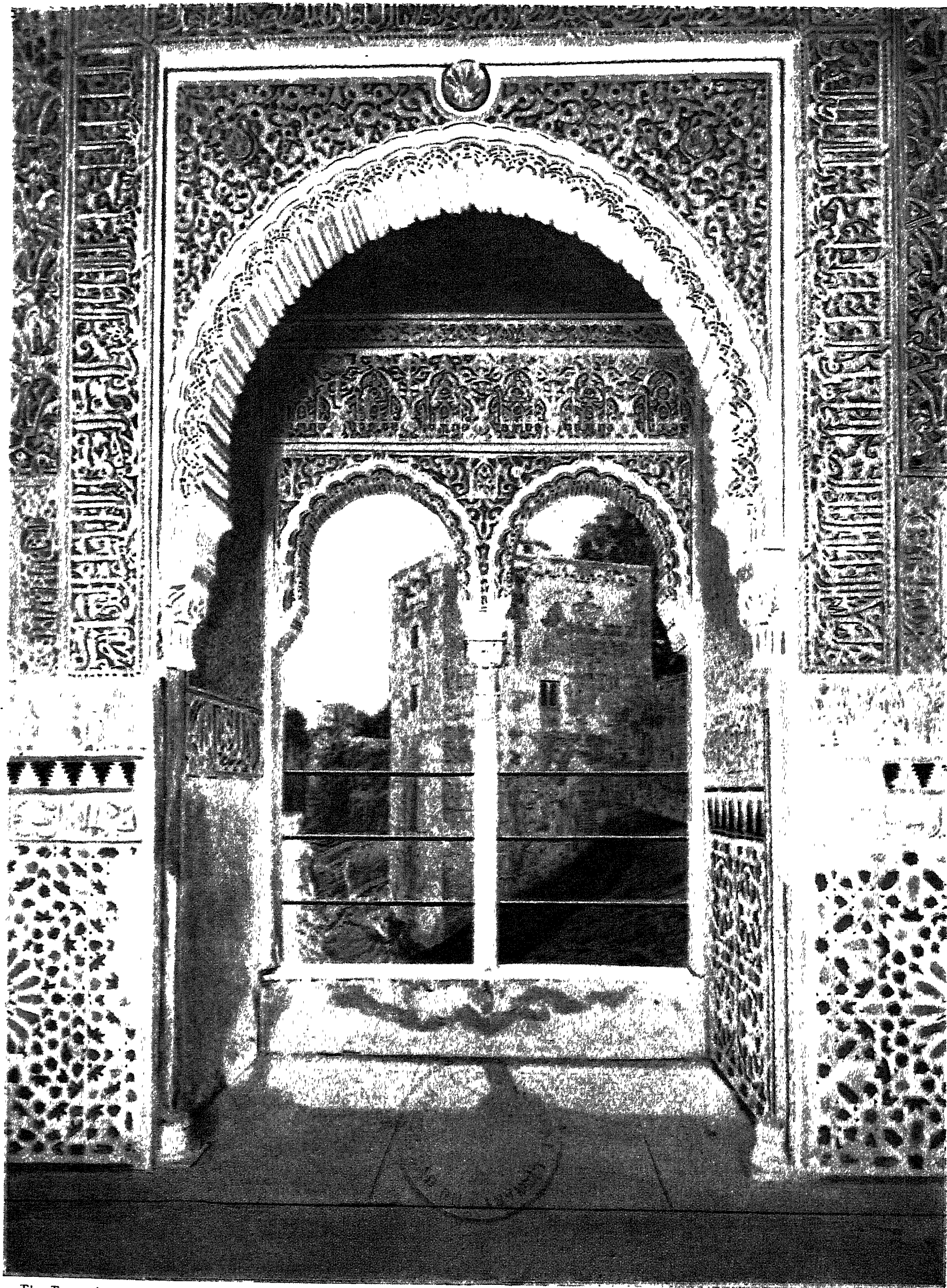
stars, called Algol variables, the cause of whose waxing and waning brightness can be explained with certainty: the stars are partially eclipsed by the dark companion revolving round each of them. During the greater part of the time Algol is a star of the second magnitude, but every 2 days 20 hrs. 40 mins. it drops down to the third magnitude, and then immediately begins to brighten again, the whole change occupying 9 hrs. 20 mins.

**Algoma.** Subdivision of Ontario, Canada. Occupying an area of more than 71,378 sq. m., it extends from Lake Nipissing in the E. to the Lake of the Woods in the W. It is a rich mining region, where iron, copper, silver, nickel, platinum, etc., are found, and is served by the C.P.R. The town of Algoma lies on the N. channel of Lake Huron. Pop. (1951) 64,496.

**Algonkian.** Geological name applied to Pre-Cambrian strata of N. America which consist of relatively unaltered sedimentary and lava rocks. They usually rest on older Pre-Cambrian rocks that have been greatly altered by heat, pressure, and chemical changes to form schists, gneisses, and granite rocks. The term Proterozoic is sometimes used instead of Algonkian.

**Algonquin.** Tribe of N. American Indians. They give their name—meaning at-the-fish-spear-ing-place—to the family of Algonquian languages which were once spoken over a region extending from Hudson Bay and Labrador to the Great Lakes, and from the Atlantic seaboard to the headwaters of the Missouri. These languages are now spoken by some 55,000 in Canada and 40,000 in the U.S.A.





The Torre de la Cautiva (captive's tower), seen from one of the windows of the Alhambra: it is so called from a probably mistaken idea that Isabel de Solis, Spanish queen of Abu'l Hasan, one of the later Moorish rulers, was imprisoned here

The Alhambra, which is both a palace and a fortress, was begun in the 13th century and completed in the 14th. It is situated on a spur of the hills on which Granada is built, and overlooks a deep ravine, through which flows the river Darro

#### ALHAMBRA ORNATE PALACE OF THE MOORISH KINGS OF GRANADA



for an illegal purpose, *e.g.* to escape justice, it may be legitimate, *e.g.* the pseudonym of a writer or actor. The modern use of the word is derived from a legal adverbial form formerly put down in indictments. To ensure the identity of a person charged with crime his indictment would run: Henry Jekyll alias Edward Hyde. *Pron.* ai'-lee-äss.

**Ali Baba.** Hero of one of the tales in *The Arabian Nights' Entertainments*, that of Ali Baba and the Forty Thieves. Ali Baba is a poor man who happens upon the knowledge of a robbers' hoard and of the secret words, "Open Sesame," which gain admittance to it. His brother Cassim finds out the secret and loses his life. The thieves seek to discover who has learnt their secret, and are successively killed in the attempt, thanks to the quick-wittedness and courage of Ali's slave Morgiana.

**Ali Bey** (1728-73). Mameluke sultan of Egypt. Born in Abkhazia, a region in the Caucasus, then under Turkish rule, he became head of the Mamelukes (*q.v.*), and, taking advantage of war between Turkey and Russia, increased the number of the Mamelukes and reduced that of the Janissaries (*q.v.*). He assumed independent power about 1768 and, having subdued Syria and a large part of Arabia was proclaimed sultan of Egypt by his cousin and nominee, the sherif of Mecca. His adopted son, Mahomet Bey, bribed by the Turkish government to lead an army against him, drove Ali Bey into Syria. Then, at the battle of Salahia, he was captured by his son-in-law Abu Dahab; he died of his wounds.

**Alibi** (Lat., elsewhere). A name given to a plea by an alleged criminal that he was somewhere else at the time. False alibis are very common, because nothing is easier than for witnesses who were in fact with the accused on some other day to alter the date and state that they were with him on the day of the crime. They can give full details of everything that happened, and nothing is false but the date.

**Alicante.** Province of S.E. Spain. Mountainous in N. and W., level and fertile elsewhere, it includes parts of the old provs. of Valencia and Murcia. The climate is equable; wine, fruits, and esparto grass are produced; lead, iron, and copper are mined. Area 2,185 sq. m. Pop. (1950) 635,632.

The capital, also called Alicante (the Roman Lucentum), is a sea-

port, with a good harbour, and is a winter resort. It is connected by rly. with Madrid and Murcia. The cathedral is modern. Cigars, textiles, and other local products are exported. Pop. (1950) 104,222.

**Alice.** Township of Cape Province, S. Africa, named after Queen Victoria's second daughter. It lies 88 m. by rly. W. of East London. Here is Lovedale mission station, and Fort Hare, university college for Africans. Pop. (1951) 3,510.

**Alice** (1843-78). Grand duchess of Hesse-Darmstadt. The second daughter of Queen Victoria, she was born at Buckingham Palace, April 25, 1843, and was baptized Alice Maud Mary. In 1862 she married Louis, afterwards grand duke of Hesse. Her eldest daughter, Victoria Alberta, married Louis of Battenberg, later marquess of Milford Haven; their eldest daughter Alice married Prince Andrew of Greece and became the mother of Philip (created H.R.H. the duke of Edinburgh in 1947), consort of Elizabeth II. Princess Alice founded the Women's Union for Nursing the Sick and Wounded in War. She died Dec. 14, 1878, of diphtheria, caught in nursing her husband and children.

**Alice's Adventures in Wonderland.** A fantastic tale for children, written by Lewis Carroll (C. L. Dodgson). First published in 1865, it originated in a story which the author improvised for some child friends, notably Alice Liddell, daughter of the dean of Christ Church, Oxford, and then wrote down for them. Illustrated by Sir John Tenniel, it enjoyed wide popularity, being followed in 1871 by a scarcely less attractive sequel, *Through the Looking-Glass and What Alice Found*

There. These books, in their lively but dreamlike combination of extravaganzas, parody, and inverted logic, struck a new note in nursery fiction. The sequence of odd characters, *e.g.* the Mad Hatter, the Cheshire Cat, the Duchess, the White Knight, have made the books lasting favourites with both children and adults.

The MS. of *Alice's Adventures in Wonderland*, bought for £12,500 by Luther Evans, librarian of Congress, was in 1948 returned by him to the U.K. as a gift from the U.S.A. to the people of Great Britain; it was placed in the British Museum.

**Alice Springs.** Town of Australia, the largest in a 600-m. stretch of country in the central portion of the Northern Territory. It lies on Todd river, 2,000 ft. above sea level, 1,120 m. N.W. of Adelaide, and just 16 m. S. of the Tropic of Capricorn; it was named after Alice, wife of the postmaster-general of South Australia, Sir Charles Todd, who was responsible for the construction of the transcontinental telegraph line to Darwin. Surrounded by mountains, it has a good climate. It is the terminus of the railway from Adelaide, and the focal point for air services in the area. Stuart Highway, a road built during the Second Great War as a strategic link, joins Alice Springs to Birdum, the terminus of the railway from Darwin.

Alice Springs is administered by the Commonwealth government which is responsible for all social services and public utilities, and also supervises mining activities in central Australia. The centre of the school of the air for "out-back" children, it has long been also a base for the flying doctor service: here is a memorial to the founder of this service, John Flynn, "Flynn of the Overland." Pedal radio keeps the town in contact with remote stations. Alice Springs has been suggested as the site for Australia's first "atomic power station. Hermannsburg, a long-established Lutheran mission for aborigines, is 80 m. N.W. near the Finke river; this and the many natural beauty



Alice at the Mad Hatter's tea-party. One of Sir John Tenniel's illustrations to Lewis Carroll's story "Alice's Adventures in Wonderland"

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Hague convention of 1930 under which, if the nationality laws of a state are inconsistent with international conventions, customs, and generally accepted principles, other states are not bound to recognize them. A country can, moreover, define a class of persons who are neither aliens nor nationals (*e.g.* citizens of the Republic of Ireland are not as a rule nationals of the U.K., but are never aliens in relation to the U.K.).

Overlapping of the laws of two states may give a person two nationalities—*e.g.* if he is born in a state that holds all persons born within its territory to be nationals, and is the son of a national of another state which imposes its nationality on the children of its nationals wherever born.

A person may have no nationality, that is, be stateless, an alien everywhere (*See* Displaced Person; Nationality; Refugee).

In general no state is bound to admit an alien. The universal declaration of Human Rights (*q.v.*) adopted in 1948 by the general assembly of the United Nations provided that everyone has the right to seek and enjoy in other countries asylum from persecution; but this declaration is not legally binding even on countries that endorse it.

Many states will not admit an alien even temporarily unless, in addition to holding a passport from the state of which he is a national, he has also previously obtained a visa from the state he wishes to enter. Among other normal requirements are that the alien must show he has the means to support himself and his dependents and that, if he proposes to enter some employment, he holds any necessary permit.

A state is not bound to surrender an alien to any other state unless he is required by that state for trial for a crime which is an extraditable crime under a treaty between the two states (*See* Extradition). A state any of whose nationals are improperly treated in another state is entitled, but not bound, to protect them. A state may prevent an alien from owning certain kinds of property—*e.g.* land or ships; it may exclude him from certain occupations.

An alien is not normally liable to compulsory military service in the state which has received him (but in war time allies sometimes agree to its being exacted from one another's nationals). Aliens unless entitled to Diplomatic Privilege (*q.v.*) are subject to the

laws and courts of the state in which they reside; exceptions have been the so-called Capitulations (*q.v.*) formerly in force in *e.g.* Egypt, and arrangements sometimes made between allies exempting (or partially exempting) visiting armed forces from the jurisdiction of the country visited.

An alien owes allegiance to the state which has received him so long as he is residing there, and if he commits acts against this state he will be guilty of treason (*see* Joyce, William).

In general an alien is allowed to leave a state so long as he has performed his obligations in it—*e.g.* has paid his taxes. He is also in general entitled to take with him his assets, subject to obtaining any licence that may be necessary before assets can be taken out of the state.

In theory a state is entitled to expel an alien at its absolute discretion, but in peace-time it is generally accepted that the power is not exercised without some just cause. In the event of war, the nationals of one state in the territory of the opposing state are protected both by the customary rules of international law and, when both belligerents are parties to it, by the Geneva convention of 1949 on the protection of civilian persons (*see* Geneva Convention).

**Alif.** First letter of the Arabic alphabet. Used as a symbol for Allah, the Muslim name of the Deity, it is often set at the head of Arabic documents. Its sound is a short ah, except when marked with the long sign (like the Spanish *tilde*), when it ranks as a full vowel.

**Aligarh.** District and fortified town of India. The district, area 1,946 sq. m., is in the Agra division of Uttar Union. The town, generally called Koil (Aligarh being strictly the name of the fort), is 55 m. N. of Agra by rly.; it trades in cotton, grain, and indigo, and has a large dairy industry and electro-plating works. The fort was considered impregnable, but was captured from the Mahrattas by Lord Lake in 1803. Both town and district were successively plundered during the Mutiny of 1857. Pop. (1951) town, 141,618; dist., 1,543,506.

The Aligarh College, a famous Muslim centre of learning, founded in 1875 by Sir Syed Ahmad Khan, reconstituted in 1920 as the Aligarh Muslim University, was in 1951 opened to non-Muslims.

**Alima.** River of French Equatorial Africa. Rising near Ogowe Springs, it flows E. and S.E. to the Congo which it enters some 250 m. N. of Brazzaville. Discovered by De Brazza in 1878, it is 400 m. long, about 200 m. being navigable.

**Alimentary Canal.** The channel leading from the mouth to the anus, along which the food passes in the process of digestion. It is composed in man of the oesophagus or gullet: the stomach; the small intestine, which is divided into the duodenum, about 9 ins. long, and the jejunum and ileum, together about 23 ft. long; the large intestine, about 6 ft. long; and the rectum.

**Alimony.** Legal term used for an allowance in money ordered by the high court to be paid by the husband or, if the proceedings are on the grounds of the husband's insanity, by the wife, to the other spouse while the marriage is still in existence. Thus alimony may be ordered either while proceedings for divorce or judicial separation are pending (*alimony pendente lite*), or after a decree of judicial separation (*permanent alimony*).

Alimony is often confused with maintenance, which is usually the sum that may be ordered to be paid—usually by a guilty husband—when the marriage has been ended by divorce or a decree of nullity. On the other hand, if a wife obtains a separation order in a magistrate's court—which does not end the marriage—the sum he is ordered to pay her is called maintenance.

**Aline.** Sea-loch of Argyllshire, Scotland. Forming an arm of the Sound of Mull, it is 2½ m. long and ½ m. wide. Near are the ruins of Kinlochaline Castle.

**Alington, CYRIL ARGENTINE** (1872–1955). British educationist, cleric, and writer, headmaster of Eton, 1916–33. The son of a



Cyril Alington,  
British educationist  
and cleric

Lincolnshire clergyman, he was educated at Marlborough and Trinity College, Oxford, and became a fellow of All Souls in 1895. After holding masterships at Marlborough and Eton, he took holy orders and was appointed

alchemists. The term was coined, possibly by Paracelsus, to imitate an Arabic word. *See* Alchemy.

**Alkali.** A native judge who acts under the warrant of the governor of Nigeria.

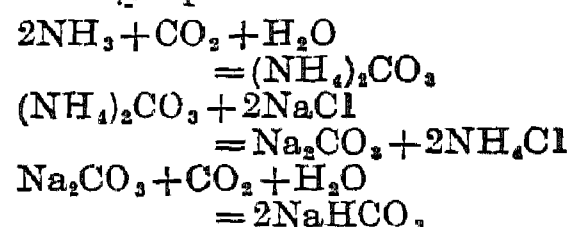
**Alkali** (Arab. *al*, the; *qali*, ashes of salt-wort). This rather vague word was used to denote the hydroxides of lithium, sodium, and potassium, the oxides of these three elements and of calcium, strontium, and barium, and also ammonium carbonate and the carbonates of lithium, sodium, and potassium. The most important of all these are sodium hydroxide (caustic soda), sodium carbonate (soda), and potassium carbonate (potash). Potash was in early days obtained from the ashes of burnt vegetable matter (land plants); soda was obtained partly from the ashes of seaweeds, kelp, and partly from natural deposits of trona, the sesquicarbonate,  $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$ , found in Egypt and in some other localities. In 1775 the French Royal Academy of Science offered a prize for the best method of obtaining sodium carbonate from common salt. The prize should have been awarded to Nicholas Leblanc, who in 1790 started the manufacture of soda at S. Denis by a process of his own invention, but it was not awarded and in 1792 Leblanc's patents and his works were confiscated by the French government. Leblanc was reduced to poverty and committed suicide in 1806. This process was introduced into England by Losh in 1796, and was developed on a

larger scale by Muspratt in 1823 and by other manufacturers here who made use of the various by-products formed in the process, until the alkali industry included the manufacture of many of the compounds of sodium and potassium that were of commercial importance.

The Leblanc process used common salt,  $\text{NaCl}$ , limestone,  $\text{CaCO}_3$ , and coal (impure carbon) as its raw materials. The first step was to treat the salt with sulphuric acid so as to make sodium hydrogen sulphate and hydrochloric acid; the sodium hydrogen sulphate was heated with limestone and coal to make sodium carbonate and calcium sulphide; the hydrochloric acid was collected and used for making bleaching powder and other substances, and the calcium sulphide was originally thrown away, but in later years the sulphur in it was converted into sulphuric acid and used for a variety of chemical operations. The sodium carbonate was used as washing soda, and in the manufacture of glass and soap, and the industry attained great importance. The Leblanc process for making soda flourished on a very large scale in Great Britain for a period of about seventy years; it depended for its success partly on the recovery and use of the by-products made in the process, one of the most important being chlorine. Weldon in 1869 and 1870 effected a notable saving in this recovery; the price of bleaching powder was reduced by £6 a ton; its production was

quadrupled, and something like £750,000 per annum was added to the national wealth. The French chemist Dumas said that by Weldon's invention every sheet of paper and every yard of calico had been cheapened throughout the world. In spite of its success the Leblanc process was driven out of existence by a better one, the Solvay process.

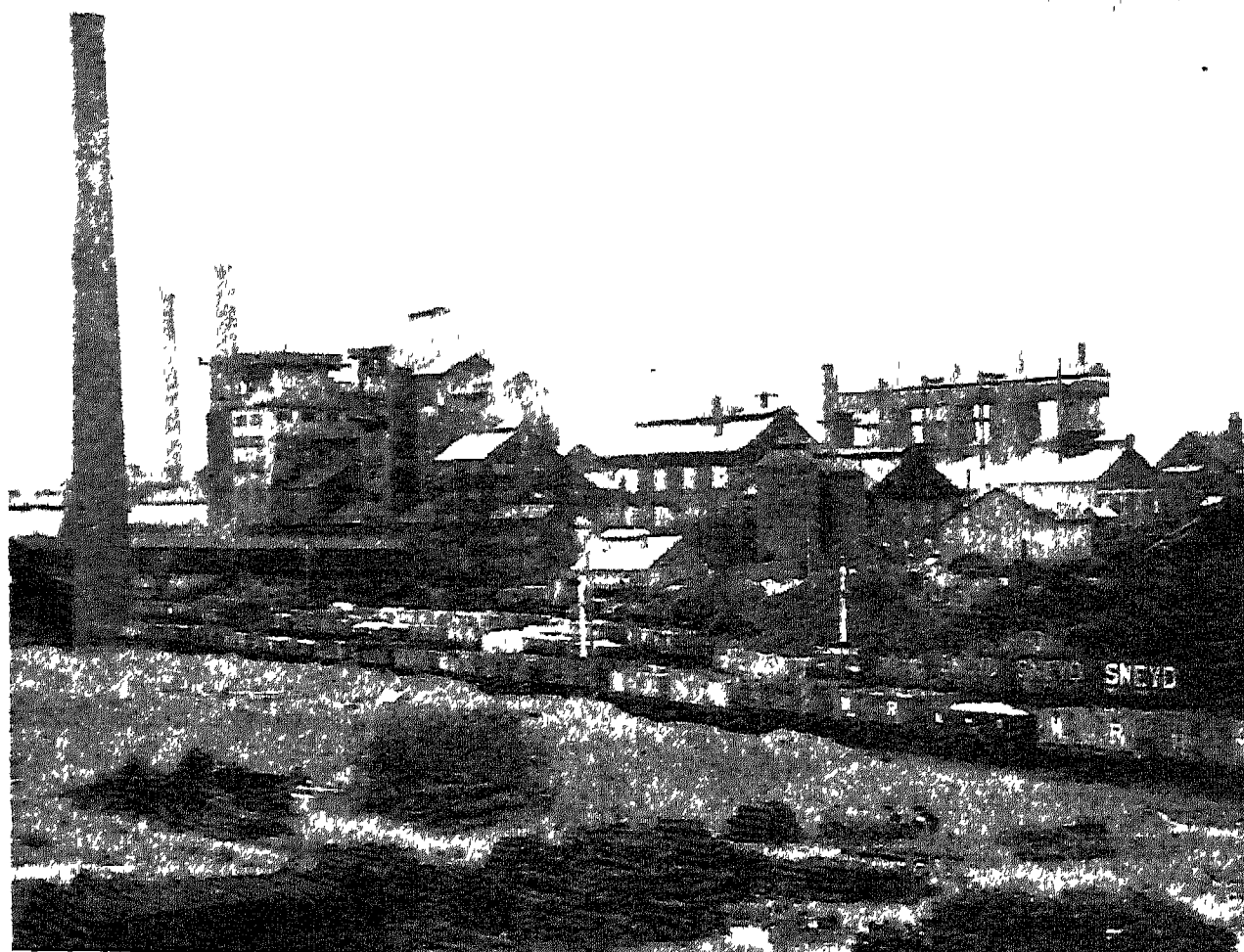
This process, known as the ammonia soda process, was started by Ernest Solvay and his brother in Belgium in 1865 and after a long struggle drove the Leblanc process out of existence. The Solvay process consists in saturating a solution of sodium chloride (brine) with ammonia and carbon dioxide in accordance with the following equations:—



The  $\text{NaHCO}_3$ , sodium bicarbonate, so formed is heated to produce the normal carbonate, carbon dioxide, and steam, the action being as follows:—



In the year 1873 the Solvay firm granted to John Brunner and Ludwig Mond a licence to use this process in Great Britain, and the two started a works in Cheshire. Gradually, largely owing to Mond's determination and chemical knowledge, they overcame the considerable difficulties of the process and greatly improved it so that it became more economical than the Leblanc process. The raw materials of the Solvay process are lime, carbon dioxide, and ammonia. The carbon dioxide is obtained by heating limestone in kilns, and the quicklime so made is used in the process for the recovery of ammonia. A strong solution of brine is saturated with ammonia and the solution falls down a tower fitted with baffle plates and meets an ascending current of  $\text{CO}_2$ ; the sodium bicarbonate, not being very soluble, crystallises out. The sodium bicarbonate is converted into the normal carbonate by heating it in open pans; the anhydrous sodium carbonate is called soda ash; if this is dissolved in water and allowed to crystallise, crystals of the decahydrate,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , are formed. This compound is called washing soda; from it the crystal carbonate,  $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$  can be prepared by slow evaporation. Another sodium carbonate is known as concen-



**Alkali.** One of several great plants devoted to the production of alkalis and the numerous chemical processes connected with their use  
Photo, courtesy of Imperial Chemical Industries



then poured over the contents of the percolator and the liquid allowed to filter slowly through. This liquid is collected and concentrated, ammonia is added, and the liquid shaken with ether or chloroform.

The alkaloids are dissolved by the ether or chloroform, and as these liquids separate they are removed to another vessel. The chloroform or ether being then evaporated, the impure alkaloid remains. This is a very general statement, as experience has shown better methods of extraction in particular instances. There are several reagents which give precipitates when added to liquids containing alkaloids. The chief alkaloidal reagents are—(1) solution of iodine in potassium iodide; (2) solution of the double iodide of mercury and potassium; and (3) solution of phospho-molybdic acid. These reagents can be employed for both qualitative and quantitative tests. Certain distinctive colours given by sulphuric acid and ferric chloride are also indications of the alkaloid present.

Many alkaloids exactly represent the active medicinal agent of the plant, but sometimes the activity of a drug is due to more than one alkaloid—e.g. opium, cinchona bark, and nux vomica. Several of the alkaloids are violent poisons, but in appropriate doses form valuable medicines. Most of them are solids, but a few, such as coniine, are liquids. Attempts have been made to classify alkaloids, but no final method has been adopted. The principal alkaloids obtained from the vegetable kingdom are the following:

Aconite (*Aconitum Napellus*, etc.).—Aconitine, lycaconitine, atisine.

Areca nut (*Areca catechu*).—Arecoline, arecaidine, guvacine, guvacoline.

Barberry (*Berberis vulgaris*).—Berberine, oxyacanthine, berbamine.

Belladonna group (*Atropa belladonna*, *Hyoscyamus niger*, *Datura stramonium*, etc.).—Atropine, hyoscyamine, hyoscine.

Broom (*Cytisus scoparius*).—Sparteine.

Calabar bean (*Physostigma venenosum*).—Eserine or physostigmine, eseramine, physovenine.

Calumba (*Jatropha palmata*).—Jatrorrhizine, columbamine, palmatine.

Cevadilla (*Veratrum Sabadilla*).—Cevadine, cevadilline, veratridine, sabadine, sabidinine.

Cinchona (*Cinchona officinalis*, etc.).—Quinine, quinidine, quinaamine, quinicine, quinoidine, cinchonidine, cinchonine, cinchonidine,

cinchonamine, cupreine, concusconine.

Coca (*Erythroxylon coca*).—Cocaine, cocamine, truxilline.

Ergot (*Claviceps purpurea*).—Ergotinine, ergotoxine.

Golden seal (*Hydrastis Canadensis*).—Hydrastine, berberine, canadine.

Hellebore (*Veratrum album*).—Jervine, veratralbine.

Hemlock (*Conium maculatum*).—Coniine.

Ipecacuanha (*Cephaelis Ipecacuanha*).—Emetine, cephaeline.

Jaborandi (*Pilocarpus microphyllus*).—Pilocarpine, pilocarpidine.

Laburnum (*Laburnum vulgare*).—Cytisine.

Lobelia (*Lobelia inflata*).—Lobeline.

Lupine (*Lupinus luteus*, etc.).—Lupinine, lupinidine, lupanine, arginine.

Meadow saffron (*Colchicum autumnale*).—Colchicine.

Nux vomica (*Strychnos nuxvomica*).—Strychnine, brucine.

Opium (*Papaver somniferum*) (in order of discovery).—Morphine (1816), codeine, thebaine, papaverine, meconidine, codamine, laudanine, laudanidine, laudanoline, lanthopine, protopine, cryptopine, papaveramine, rhoeadine, narcotine, gnoscopine, oxynarcotine, narceine, pseudomorphine, tritopine, hydrocotarnine, xanthaline (1893).

Papaw (*Carica papaya*).—Carpaine.

Pepper (*Piper nigrum*).—Piperine, piperidine.

Pink root (*Spigelia Marilandica*).—Spigeline.

Pituri (*Duboisia Hopwoodi*).—Piturine.

Pomegranate (*Punica granatum*).—Pelletierine.

Potato (*Solanum tuberosum*).—Solanine, solanidine.

Stavesacre (*Delphinium staphisagria*).—Delphinine, delphisine, delphinoidine, staphisagroire.

Tea, coffee, and cocoa (*Camellia Thea*, *Coffea Arabica*, *Theobroma cacao*).—Caffeine or theine, theobromine, theophylline, xanthine, adenine.

Tobacco (*Nicotiana tabacum*).—Nicotine.

Yellow jasmin (*Gelsemium sempervirens*).—Gelsemine, gelseminine.

Yohimboa (*Tabermontana* species).—Yohimbine, yohimbenine.

Of late years a series of artificial alkaloids has been prepared and a few are largely produced in this manner. For detailed information on specific alkaloids reference should be made to Henry's Plant Alkaloids, 3rd edn., 1939; and Thorpe's Dictionary of Applied Chemistry, 4th edn., 1937-43.

A. Shepherd

**Alkalosis.** Term used in medicine to describe the conditions in which there is an increase

in the alkali reserve of the blood. It may be induced by giving excess of sodium bicarbonate or other alkali.

**Alkanet.** Name of certain plants of the family Boraginaceae, such as *Anchusa officinalis* and

*Alkanna tinctoria*; also of a colouring material obtained from the root of the latter species, which plant is a native of S. Europe. It is an herbaceous perennial with oblong, bristly leaves, and bright blue funnel-shaped flowers.



Alkanet,  
*Anchusa officinalis*

**Al-Khwarizmi.** Arabian mathematician and philosopher of the 9th century A.D., born in Khwarizm, the modern Khiva, in the delta of the Amu-Daria river. He wrote a book, *Al-jabr w'al-muqâbalah*, concerned with the solution of equations, from which the name algebra is derived. His name is perpetuated in the term Algorithm (q.v.).

**Al-Kindi, ABU YUSUF YAKUB IBN-ISHAQ.** Arabian philosopher and mathematician of the 9th century A.D. Born at Basra, he was nicknamed philosopher of the Arabs. He made translations of Plato and Aristotle, wrote a commentary on each separate work, and later wrote a treatise in which he essayed a synthesis of Platonic and Aristotelian thought. The Alexandrian catalogue listed nearly 300 scientific works from his pen; but except for fragments his works are lost.

**Alkmaar.** Town of the Netherlands, in the prov. of N. Holland. On the N. Holland Canal and the rly., 5 m. E. of the sea and 20 m. N.N.W. of Amsterdam, it is a famous cheese-market. Its industries include a foundry and engineering works, paper, furniture, and food processing factories. It was granted a city charter in the 13th century. Its architectural features include the 15th-century church of S. Laurence; an early 16th-century town hall; and a weigh-house dating from 1582. The town withstood a siege by the duke of Alva, Aug. 21-Oct. 8, 1573. Pop. (1947) 37,837.

**Alkyl.** Name given to a series of hydrocarbon radicals. Methyl, ethyl, butyl, and amyl are the best known. Alcohol is the alkyl hydroxyl derivative of ethyl.

**Allan, DAVID** (1744-96). Scottish painter. Born at Alloa, he went to Italy at the age of twenty to pursue his studies, painting in the style of Poussin. He returned to Britain in 1777, and after supporting himself by portrait painting in London, settled in Edinburgh, where he was made master of the Academy in 1786. He is sometimes referred to as the Hogarth of Scotland. Allan's self-portrait is in the Scottish National Gallery.

**Allan, SIR HUGH** (1810-82). Canadian shipowner. Born at Saltcoats, Ayrshire, Sept. 29, 1810, Allan went in early life to Canada, where he became partner in a shipping firm. About 1852 he founded the Allan line of steamers and was one of the promoters of the C.P.R. His donation to the party funds in Canada in 1873 was denounced as corruption and helped to bring about the Conservative defeat at the ensuing general election. Knighted in 1871, he died in Edinburgh, Dec. 9, 1882.

**Allan, MAUD** (b. 1879). British dancer. Born at Toronto of parents from the United Kingdom, and educated at San Francisco, she studied music at Berlin and classical art in Italy. Fired with the desire to revive the classic dance, she first appeared as a professional dancer in Vienna in 1903, and later achieved success as a dancer in London and in the U.S.A. She is specially remembered for her appearance as Salome in 1908. Returning to England in 1928, she appeared as the Abbess in *The Miracle*, 1932. Later she devoted herself to teaching very poor children.

**Allan, SIR WILLIAM** (1782-1850). Scottish painter. Born in Edinburgh, he was apprenticed to a coach-painter, and later studied at the R.A. schools in London. After residing in Russia, 1805-14, he returned to Edinburgh and took to genre and history painting,



Sir William Allan,  
Scottish painter

finding subjects in *The Waverley Novels*. His *Regent Moray Shot by Hamilton* secured his election as A.R.A., and in 1835 he became R.A. Three years later he was elected president of the Royal Scottish Academy, and in 1841 succeeded Sir David Wilkie as limner to the queen in Scotland, an office which carried a knighthood. In 1843 he exhibited his *Waterloo*, which was purchased by the duke of Wellington. In 1844 he again went to Russia to obtain materials for his picture of Peter the Great Teaching his Subjects Shipbuilding. While engaged on a picture of the battle of Bannockburn, he died in his studio in Edinburgh, Feb. 23, 1850.

**Allan, SIR WILLIAM** (1837-1903). British politician and engineer. Born at Dundee, Nov. 29, 1837, he served in the navy as an engineer. In 1866 he settled in Sunderland, where he built up a big engineering business. He was one of the first employers to establish an eight-hour working day. From 1893 until his death Allan was Liberal M.P. for Gateshead. Knighted in 1902, he died Dec. 28, 1903. He wrote much Scottish verse.



Maud Allan, British dancer,  
as Salome, her most sen-  
sational representation

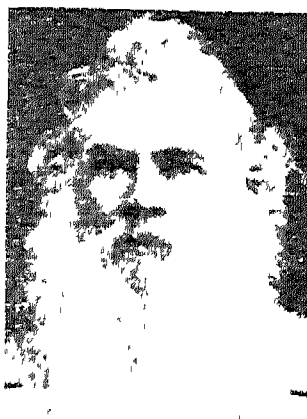
it was the first to adopt steel in the construction of its vessels, the turbine as a method of propulsion, and twin screws and bilge keels for checking oscillation. In 1917 the control was taken over by the Canadian Pacific Ocean Services, Ltd. (later Canadian Pacific Steamships, Ltd.).

**Allantois.** Structure associated with the embryo in birds, reptiles, and mammals. It arises from the embryonic gut as a blind sac. Its walls are richly supplied with blood vessels, and through the blood supply to the allantois embryonic respiration takes place. In birds and reptiles its central cavity is used as a store for the products of excretion that have to accumulate during life in the egg-shell. The allantois is left behind when the young bird or reptile hatches. In mammals the allantois is not so

large a structure, appearing in many, including man, as a small solid rod.

**Allegation.** English legal term. It means a statement as yet unproved, but which those responsible for it believe to be true. Thus a phrase such as "an alleged criminal" is often applied to a person accused of crime before the charge has been substantiated in a court of law. In civil actions the facts necessary to establish the claim or defence are set out in allegations in the pleadings.

**Allegheny** OR ALLEGHANY. River of U.S.A. Rising in the N. part of Pennsylvania, it passes into



Sir William Allan,  
British engineer

New York and curves again into Pennsylvania, where it follows a S.W. and S. course to Pittsburgh and unites with the Monongahela to form the Ohio. Its length is about 300 m., and it is navigable by small vessels for nearly 200 m.

**Allegheny.** Industrial suburb of Pittsburgh, U.S.A. Formerly a city of Pennsylvania, it stands on the right bank of the Ohio river. It has several important educational institutions, a public library, observatory, and state penitentiary. An important rly. centre, on the Baltimore and Ohio and other rlys., it engages in the manufacture of pickles and preserves, and has rolling mills, foundries, breweries, etc. It gives its name to a county with a pop. (1950) of 1,515,237.

**Allegheny Mountains.** Mountain system of the U.S.A., forming part of the western plateau of the Appalachians (*q.v.*). It comprises a series of parallel and uniform ridges extending north-easterly from the N.E. limits of Tennessee to Pennsylvania and forming the watershed of rivers flowing W. to the Ohio, E. to the Atlantic Ocean. Formerly well forested, the Alleghenies contain deposits of iron, coal, and brimstone. Their mean elevation is about 2,500 ft.

**Allegiance** (Lat. *ad.*, to : *ligare*, to bind). The duty which a subject owes to the sovereign. Only persons who owe allegiance can be guilty of treason, for treason is essentially a violation of allegiance. All British subjects and nationals owe allegiance, and so also do aliens resident within the realm so long as they or their families



**Allen, Sir Hugh Percy** (1869–1946). British musician. He was born at Reading, Dec. 23, 1869,

and educated at Kendrick School, Reading, and Christ's College, Cambridge. At the age of eleven he was appointed organist of St. Saviour's, Reading. He subsequently



Sir Hugh Allen,  
British musician

held many similar appointments, and became closely associated with the music of both Oxford and Cambridge and developed the musical life of the universities. He was director of the Royal College of Music, 1919–37, was appointed professor of music at Oxford, 1918, and became president of the Royal College of Organists. He was conductor of the London Bach Choir and the Oxford Bach Choir. He was knighted in 1920, created K.C.V.O. 1928, G.C.V.O. 1935. He died Feb. 20, 1946. *Consult* Life, C. Bailey, 1949.

**Allen, Sir James** (1855–1942). New Zealand politician. Born in S. Australia, and educated at



Sir James Allen,  
N.Z. politician

Clifton and S. John's College, Cambridge, he became a mining engineer. Settling in New Zealand, he entered the legislature in 1887, and in 1912 was made minister of

finance, education, and defence. He had much to do with sending New Zealand troops to the First Great War, and in 1917 was made a K.C.B. In 1919 he was made minister for external affairs. He was High Commissioner for New Zealand, 1920–26, and a member of the legislative council from 1927 to his death, July 28, 1942.

**Allen, James Lane** (1849–1925). American novelist. Born at Lexington, Kentucky, and educated at Transylvania University, for some years he was a schoolmaster, then a teacher at Kentucky University, afterwards acting as professor of Latin



James Lane Allen,  
American novelist

at Bethany College, West Virginia. His novels, poetically conceived and delicately written transcripts of life in his native state, include *A Kentucky Cardinal*, 1895; *The Choir Invisible*, 1897; and *A Cathedral Singer*, 1916. He died Feb. 18, 1925.

**Allen, Ralph** (1694–1774). English postal reformer. On becoming deputy postmaster at Bath, he devised a system of cross-posts in England and Wales, which from 1720 to his death yielded him a profit of £500,000. His wealth, increased by the successful working of stone quarries near Bath, was lavishly expended, and Allen became known as *The Man of Bath*. Fielding has drawn him as *Squire Allworthy* in *Tom Jones*.

**Allen, William** (1532–94). English cardinal. Born of Roman Catholic parents at Rossall, Lancashire, and



William Allen,  
English cardinal

educated at Oriel College, Oxford, he was appointed principal of S. Mary's Hall, Oxford. He left England soon after the accession of Elizabeth

and was largely responsible for the foundation in 1568 of the college for English priests established at Douai and afterwards transferred to Reims. He began the translation of the Douai Bible. *See* Bible.

The main aim of Allen's life was to restore Roman Catholicism in England. At first he worked quietly, training priests for propaganda work, and to the last his students had no political course of study, but about 1582 his own activities became definitely political. He supported Philip II and worked with the pope, Mary Queen of Scots, Guise, and certain of the Jesuits against Elizabeth. He signed, if he did not write, *An Admonition to the Nobility and People of England* (1588), which urged them to depose Elizabeth. In 1587 he was made cardinal, and in the event of the success of the Spanish Armada he was to become papal legate, lord chancellor, and archbishop of Canterbury. He resided at Rome from 1588 until his death, Oct. 16, 1594. *Consult* *An Elizabethan Cardinal*, Martin Haille, 1914.

**Allen, Zachariah** (1795–1882). American inventor. Born at Providence, Rhode Island, Sept. 15, 1795, he was educated at Brown University and became a barrister,

but abandoned law to enter industry. His inventive genius soon established him in Rhode Island. His most successful inventions were the hot-air furnace for central heating, 1821, and the automatic cut-off valve for steam engines, 1833. He is also memorable as the first person to calculate the available power of Niagara Falls. He died at Providence, March 17, 1882.

**Allenby of Megiddo, Edmund Henry Hynman Allenby, 1st Viscount** (1861–1936). British soldier. Born April 23, 1861, he was educated at Haileybury and entered the Inniskilling Dragoons in 1879. His earliest active service was in the Bechuanaland expedition of 1884–85, and he was in Zululand in 1888. He served with the Inniskillings throughout the South African War, and was selected in 1902 to command the 5th Lancers. The command of a brigade followed, and in 1914, when the First Great War broke out, Allenby was inspector-general of cavalry at Aldershot. He took out the cavalry division to France, was with it at Mons, and later, when it became a corps, took charge of it.

In 1915, being then a K.C.B., he succeeded Sir Herbert Plumer in command of the 5th corps, and when the battle of the Somme began had been appointed to the Third army. He led that force at the battle of Arras in 1917, but in June of that year was sent to take command of the expeditionary force in Egypt. He reorganized this after the check before Gaza, and was responsible for the campaign that drove the Turks from Palestine and



Field-Marshal Viscount Allenby,  
whose campaign liberated Palestine  
in the First Great War

tively High, Low, Jack, and Game. A full pack of 52 cards is used, the ace being the highest and the deuce the lowest, both in play and in cutting for deal. The following are the points to be scored—*High*: The highest trump out; the holder scores one point. *Low*: The lowest trump out; the original holder scores one point. *Jack*: The knave of trumps; the holder scores one point, unless the card is won by an adversary, when the winner scores the point. *Game*: The greatest number of points contained in the tricks won by either player, reckoning thus, each ace, four; each king, three; each queen, two; each knave, one; and each ten, ten. The holder of the highest total scores one point towards the game.

The game is played by two or three persons, or four players in partnerships of two. The dealer, after being determined by cutting, gives six cards to each player, three at a time, after which he turns up the next card for trumps. The elder hand, if he dislikes his cards, has the privilege of saying "I beg"; in this event the dealer must allow him to score one point, or give each player three cards more from the pack and turn up the next for trumps. If the trump then turned up be of the same suit as before, he must continue giving each player three cards and turning up the next until another trump suit is shown. If a jack is turned up for trumps it counts one point to the dealer. Tricks are made exactly as in whist. When all the tricks are played out the points are counted for High, Low, Jack, and Game.

The skill of the game consists in winning the knave of trumps, taking the tens, and endeavouring to draw the adversaries' best cards. The points for high and low are scored by their original holder; the knave of trumps counts to the owner of the trick containing it. The number of points played for is usually 7, 9, or 11. High and low points may both be made by the same card, if the only trump out, and in the case of the knave it can count as High, Low, Jack, and Game.

Blind All-Fours is the game usually played by two persons, the first card led by the non-dealer establishing the trump suit. There is no begging, and the points played for are usually 7 or 9.

**Allgemeine Zeitung**, DIE (The General News). German daily newspaper. Independent liberal in tone, it was founded at Stuttgart by Johann Friedrich Cotta. Cotta

desired Schiller to be editor, but the paper appeared on Sept. 9, 1798, under the editorship of L. F. Huber. Suppressed by the duke of Württemberg in 1803, it moved to Ulm, and thence to Augsburg, where it attained European repute. In 1882 it was transferred to Munich. In 1908 it became a weekly, in 1912 a monthly periodical, and has since ceased publication. It was often confused with the Norddeutsche Allgemeine Zeitung, Bismarck's Berlin daily, which became the Deutsche Allgemeine Zeitung the day following the signing of the armistice in Nov., 1918.

**Allgood**, SARA (1883-1950). Irish actress. She was born in Dublin, Oct. 31, 1883, studied for the stage, and under the auspices of the Irish National Theatre Society made her début at the Royalty Theatre, London, 1904. At the Abbey Theatre (*q.v.*), Dublin, she subsequently created such parts as Molly Byrne in Synge's *Well of the Saints*, *Widow Quin* in the same dramatist's *The Playboy of the Western World*, and *Cathleen* in Yeats's *Cathleen - ni - Houlihan*. She achieved great success in London in the 1920s, in *Juno* and the *Paycock*, and *The Plough and the Stars*. She died in Hollywood, Sept. 13, 1950.

**All-Hallows**, ALL-HALLOWMAS OR HALLOWMAS. O.E. name for All Saints' Day (*q.v.*). See also *Hallow-e'en*.

**Allia** OR ALIA, BATTLE OF THE. Fought July 16, 390 B.C., between the Romans and invading Gauls under their leader Brennus, on the banks of a small stream of that name, a tributary of the Tiber. The Romans were defeated, and the Gauls advanced and sacked Rome. The date of this defeat was afterwards known as *dies Alliensis* (day of Allia) and marked as unlucky in the Roman calendar.

**Alliance** (Lat. *ad*, to; *ligare*, to bind). Term applied generally to any compact between two or more states in regard to their common action or inaction in relation to other states. Of such historic compacts the majority have had no specific title.

The more important alliances down to the 17th century were generally called leagues. Later a small number bore the actual name of alliance. Of these the most notable were the Triple Alliance of 1668 between England, the United Provinces, and Sweden, directed to checking the aggression of Louis XIV; the Grand Alliance of 1689, an extension of the League of Augsburg, a coalition between the Hapsburgs, Holland, and England against Louis XIV; the renewed Grand Alliance of 1701, with the same object in view, which preceded the War of the Spanish Succession; the Quadruple Alliance of 1718 between Great Britain, France, Holland, and Austria against Philip V of Spain and the policy directed by Cardinal Alberoni.

Then, with an interval of nearly a century, came the various alliances against Napoleon, and after his overthrow the Holy Alliance, conceived by Tsar Alexander I of Russia as a league between the Christian princes, pledging them individually to rule their own subjects on Christian principles and mutually to support each other's authority. This alliance, from which England held aloof, embraced most of the monarchs of Europe, and was a dominating factor

in European politics during the ten years after Waterloo. After another long interval came the Triple Alliance between Germany, Austria, and Italy, which was formed in 1883 and came to an end in 1915. The name of the Triple Alliance has also been given to a compact made between Great Britain, Prussia, and Holland in 1788.

Powerful alliances faced each other in the First Great War. Germany and Austria-Hungary, survivors of the Triple Alliance of which Italy had been the third partner, were joined by Turkey and Bulgaria. These allies were generally known as the Central Powers. The opposing alliance, originating in that between France and Russia, consisted before the end of the war of seventeen other nations, though not all actually participated in the fighting. They



Sara Allgood, one of the original Abbey Theatre players, in *Juno and the Paycock*



territory began to fall into their hands. Allied military govt. of occupied territories (abbreviated to Amgot) was set up July 17, 1943, in Sicily one week after the landing there of British and U.S. troops. Its object was to exploit the civil effects of victory, restore civil life, and assist military operations by promoting security in the rear. Its officials were recruited from men with professional experience of central and local govt., many of whom had an extensive knowledge of European countries; they were given special training.

In Italy Amgot began to function in Nov.; there it had the assistance of an advisory council, agreed to in Oct. at a conference in Moscow and consisting of representatives of Russia and the French committee of national liberation as well as the U.K. and the U.S.A. Well behind the combat zones Amgot was gradually replaced by Italian administration, exercised under the supervision of a control commission in four groups: military, political, economic and administrative, and communications. Amgot went forward with the 15th army group to reorganize the territory as the Germans were expelled. From Dec. 31, 1945, all Italy except Venezia Giulia and Udine prov. was restored to Italian administration. From Feb., 1945, Italy conducted her relations with other governments directly, not through the commission. The Allied control commission in Italy officially ceased to function on Jan. 31, 1947.

In Germany, Allied Military Government was first established in the Aix-la-Chapelle and Trier districts in Sept., 1944. Gen. Eisenhower, supreme Allied commander, in a broadcast to the people of W. and S.W. Germany, stated that supreme legislative, judicial, and executive authority and powers were vested in himself as supreme commander and military governor; and that German courts and educational institutions within the occupied territory were suspended. All German officials were commanded to remain at their posts until further orders and to obey and enforce all orders of the Allied authorities. After the Allied Control Commission was set up in Berlin, June 5, 1945, military government was gradually superseded.

Allied Military Government began in Japan with the landing of General Douglas MacArthur at Atsugi airport on Aug. 30, 1945.

Supported for the most part by U.S. troops, with a token force from the British Commonwealth, he became virtual dictator until his recall in 1951. Allied Military Government ended with the coming into force of the peace treaty between the Western Allies and Japan, April 28, 1952. Russia was not a party to this treaty; but she had had no share in the occupation of Japan.

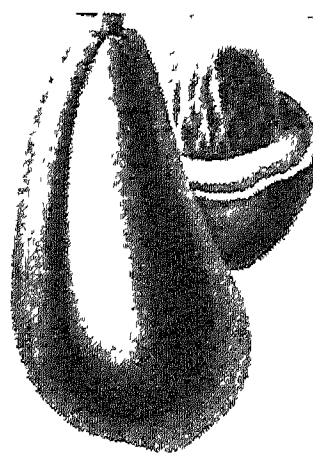
**Allier.** River of central France. Rising in Lozère and flowing N.N.W. through Haute-Loire, Puy-de-Dôme, and Allier departments, it joins the Loire about 4 m. below Nevers. Of its 356 m., 140 m. are navigable.

**Allier.** Department of central France. Bordered by the Loire, traversed by the Allier, and embracing some of the richest land in France, it produces wine, cereals, olive oil, roots, cattle, and timber, and is rich in coal, iron, manganese, antimony, copper, marble, granite, and potters' clay. It contains the spa of Vichy (*q.v.*). Moulins is the capital. Area 2,848 sq. m. Pop. (1954) 372,689.

**Alligator** (Sp. *el lagarto*, the lizard). Genus and family (Alligatoridae) of the Crocodilian order of reptiles. There are two living species of the genus. The Chinese alligator is comparatively small, up to 6 ft. long, and was not discovered until 1870 when it was found in the Yang-tse-kiang. The Mississippi alligator, which is larger, males reaching about 13 ft. in length, females about 8 ft., inhabits rivers, ponds, and streams in N. America, from N. Carolina to the Rio Grande, and feeds on small animals. The breeding season is from late May to early July. The female builds a nest of leaves and decaying vegetable matter on the banks of a pool or stream, and lays up to 50 (average 28) eggs, which are 2 to 3½ ins. long. The female guards the nest.

Members of the alligator family lived in Europe in Tertiary times. For distinction between alligators, true crocodiles, and other living members of the order, see Crocodile.

**Alligator Pear.** Fruit of *Persea gratissima*, a tree of tropical America and the West Indies, belonging to

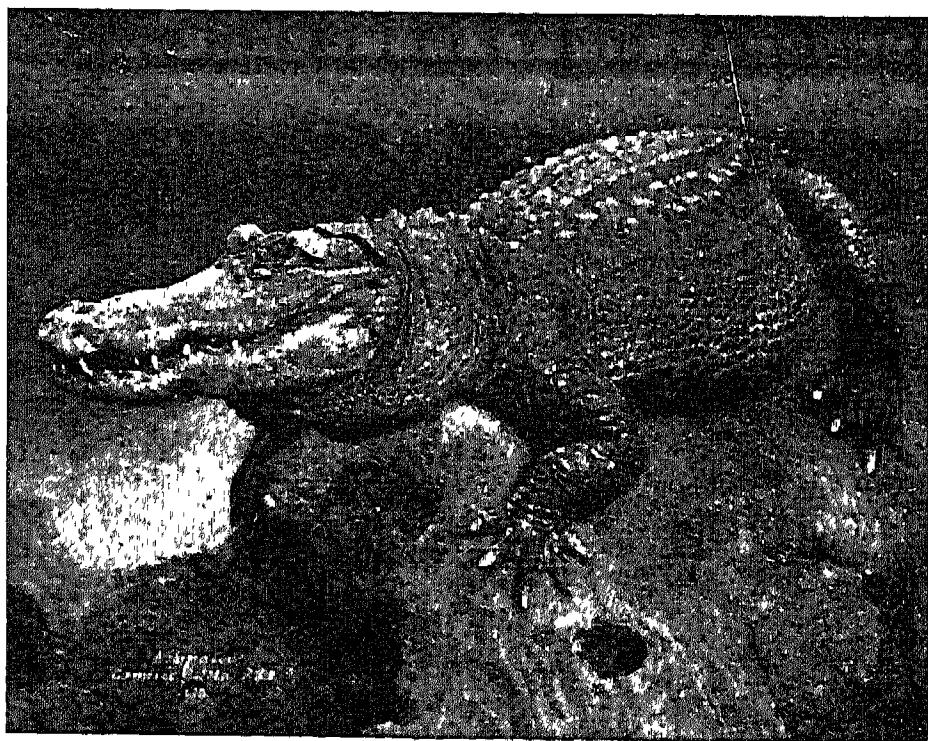


Alligator pear or Avocado pear

the family Lauraceae. It is also known as Avocado pear. It is a pear-shaped drupe, externally brownish or purple, with an oily pulp-like edible marrow which also yields a valuable oil.

**Allighan Case.** Case concerning parl. privilege in the British house of commons. Following allegations made in the World's Press News by G. Allighan, M.P. for Gravesend, that M.P.s often disclosed confidential information to newspapers for cash, a parliamentary committee of privileges sat April-July, 1947, and, after examination of witnesses, reported that the general charges were unfounded and constituted grave contempt and a gross breach of privilege. The only such transactions that could be established were accounts of one private meeting of the parliamentary Labour party. Such an account in the Evening Standard was revealed to have been written by Allighan himself, who admitted to control of a press agency through which he received £120 a month for such information. Allighan was expelled from the house of commons.

**Allingham, WILLIAM** (1824-89). British poet. Born at Ballyshannon, Donegal, March 19, 1824, to English parents, he worked in the customs until 1870. In 1874 he became editor of Fraser's Magazine. He was intimate with the Pre-Raphaelite group, and his second volume of poems, *The Music Master*, 1855, a



Alligator of the rivers of the southern states of North America, a reptile which attains a length of about 13 ft. Gambier Bolton, F.Z.S.

**Allotment.** In company law, the act of formally assigning newly created capital—e.g. shares or debentures—to applicants. By English law previous to 1900 the promoters of a company could go to allotment, however little capital had been applied for; but in 1900 the Companies Act was strengthened to prevent the scandals often arising from this procedure. In public issues now, so much of the desired capital, such amount to be named in the prospectus, must be applied for, or the allotment cannot take place and the money sent on application must be returned within forty days. A letter of allotment constitutes a contract; it is the final stage in the process of which the application is the first, and cannot be repudiated. It must bear a duty stamp; twopence if the nominal value of the shares allotted is less than £5, and one shilling if £5 or more. See Company Law.

**Allotments.** Small plots of land chiefly used for the cultivation of vegetables. The definition usually accepted is that laid down in the Allotments Act, 1922: "Any parcel of land, whether attached to a cottage or not, of not more than 2 acres in extent, held by a tenant under a landlord and cultivated as a farm or a garden, or partly as a garden and partly as a farm." The Allotments Act, 1925, enabled local authorities to let allotments up to 5 acres in extent. But these are more like small holdings. They are few in number and are mainly confined to the more rural counties.

Usually what is meant by an allotment is an "allotment garden." This parcel of land is defined by the Act of 1922 as "an allotment not exceeding 40 poles ( $\frac{1}{4}$  of an acre) in extent which is wholly or mainly cultivated by the occupier for the production of vegetable and fruit crops for consumption by himself or his family." This popular type of plot exists in large numbers in all parts of the United Kingdom. The date of origin cannot be determined with certainty. It is known that experiments in their use were tried out, with considerable success, as a means of relieving prevailing distress amongst poor people nearly 200 years ago. Parliament evidently appreciated their value even in those early days, for many of the Poor Laws passed during that time make provision for the use of land for allotments. The earliest instance of allotments being pro-

vided under an Enclosure Act was in 1806 when 8 acres of land were allotted for this purpose. The first Allotments Act proper was placed on the Statute Book in 1831.

Before the First Great War the number of allotments was very small and the movement mainly a rural one. But the urgent war-time need for augmenting the nation's food supplies stimulated development in towns and cities, and its aspect rapidly changed from rural to urban. The peak year was reached in 1920 when  $1\frac{1}{2}$  million plots were being cultivated, largely stimulated by Cultivation of Lands Orders. When these Orders were withdrawn and large tracts of land

to produce the maximum quantity of vegetable food. It is estimated that the united efforts of these small producers succeeded in raising during the Second Great War at least 100 million pounds' worth of food to supplement the nation's larder. In addition to the existing allotments many new ones were laid out in every kind of available site—in public parks and recreation grounds, on commons, on land surrounding R.A.F. stations and army camps and gun-sites, and even in many of London's residential squares.

Well planned, and properly cultivated, a small allotment garden of 10 rods (a little over 300 sq. yds.) will provide enough

vegetable food to supply a small family for nearly a whole year. Local authorities are under a statutory obligation to provide allotment gardens up to  $\frac{1}{4}$  of an acre on the application of 6 registered parliamentary electors or ratepayers resident in their districts. A large proportion of allotments under cultivation in 1945 were occupied only temporarily, but efforts were being made in most places to alter this. Many local authorities began to make provision for permanent allotments in their post-war planning schemes, as they looked upon them not only as a

#### ROTATION OF CROPS ON PLOT 90' x 30'

		Compost Heap. Tomatoes.	Tool Shed. Marrows.	Seed Bed. Radish.	Parsley.	Intercrop with Spinach (2 Rows), 6 in. between plants and follow with Leeks, (4 Rows), 1 ft. apart, 9 in. between plants
Miscellaneous Crops	<b>C DWARF PEAS</b>	2 ft. 6 in. apart	3 in. between plants	3 ROWS		
	<b>DWARF BEANS</b>	2 ft. 6 in. apart	9 in. between plants	2 ROWS		
	<b>ONIONS</b>	1 ft. apart	6 in. between plants	8 ROWS		Follow with Spring Cabbage (4 Rows), 1 ft. 6 in. apart, 1 ft. 6 in. between plants
	<b>SHALLOTS</b>	1 ft. apart	6 in. between plants	2 ROWS		Follow with Winter Lettuce, 1 ft. between rows, 9 in. between plants, intercrop with Summer Lettuce, 9 in. between plants
	<b>BROAD BEANS</b>	6 in. between plants	1 DOUBLE ROW			
	<b>RUNNER BEANS</b>	9 in. between plants	1 ROW			
Potatoes and Root Crops	<b>A PARSNIPS</b>	1 ft. 3 in. apart	6 in. between plants	3 ROWS		
	<b>CARROTS (Maincrop)</b>	1 ft. apart	6 in. between plants	5 ROWS		
	<b>POTATOES (Early)</b>	2 ft. apart	1 ft. between plants	3 ROWS		Follow with Turnip. Rows 1 ft. apart, 6 in. between plants
	<b>POTATOES (Others)</b>	2 ft. apart	1 ft. 3 in. between plants	6 ROWS		
	<b>SPINACH BEET or SEAKALE BEET</b>	8 in. between plants	1 ROW			
Winter and Spring Green Crops	<b>B CABBAGE (Winter)</b>	2 ft. apart	2 ft. between plants	3 ROWS		
	<b>SAVOYS</b>	2 ft. apart	2 ft. between plants	2 ROWS		
	<b>BRUSSELS SPROUTS</b>	2 ft. 6 in. apart	2 ft. 6 in. between plants	2 ROWS		Intercrop with Early Carrots (2 Rows), 6 in. between plants and Early Beet (1 Row), 6 in. between plants
	<b>SPROUTING BROCCOLI</b>	2 ft. apart	2 ft. between plants	2 ROWS		
	<b>KALE</b>	2 ft. apart	2 ft. between plants	2 ROWS		
	<b>SWEDES</b>	1 ft. 3 in. apart	6 in. between plants	2 ROWS		
	<b>GLOBE BEET</b>	1 ft. 3 in. apart	6 in. between plants	2 ROWS		Precede Beet with Early Dwarf Peas (1 Row), 3 in. between plants

Allotments. Scheme based on one devised by the ministry of Agriculture for the profitable cultivation over three years of a plot 30 yards long by 10 yards wide

had to be surrendered, numbers began rapidly to decline.

At the outbreak of the Second Great War they had shrunk far below the million mark. An intensive "Dig for Victory" campaign conducted by the ministry of Agriculture and Fisheries and supported by the National Allotments Society and other interested bodies, succeeded in restoring the position to the 1920 peak figure. Between the two wars about four million new houses had been built, many of them with large gardens, and the occupiers were now urged to combine with the allotment holders in an effort

means of augmenting the nation's food supplies, but also as being of great social and recreational value. Some local authorities decided to lay out their post-war allotments in such a way as to make an important contribution to local amenities, a policy which was encouraged by town planners.

The lines along which the development of allotments should proceed were indicated in a recommendation made in the Lord Justice Scott Report on land utilisation in rural areas, 1942, para. 202: "As far as possible tracts of good soil in the neighbourhood of towns and villages



to the sq. in. to  $\frac{1}{2}$  ton. Equally small additions and variations in iron will entirely change the physical properties of that metal. The question whether the action of such a minute quantity of metal in masses of others is chemical or physical is very difficult to determine. There appears to be no doubt that the action, perhaps in most cases, is allotropic.

For practical purposes an alloy may be regarded as a new metal. It will be found to have the characteristic properties of metals, e.g. metallic lustre, malleability, tenacity, ductility, and conductivity of both heat and electricity. Its physical properties, however, may differ widely in degree from those of the metals composing it. Where lead, tin, or zinc are among the principal constituents of an alloy, those metals will impart to the alloy their physical properties in proportion to their relative amounts, while the electrical conductivity of the alloy will be proportionate to the relative volumes of the component metals. Generally, the specific heat of alloys will be the mean of those of the component metals.

#### Greater Tensile Strength

On the other hand, the melting point of an alloy is lower than the mean of those of its constituents, and sometimes lower than that of the most fusible of the components. The specific gravity is scarcely ever the mean, while the tensile strength is generally greater, sometimes much greater. Thus, if pure gold, which has a tensile strength of about seven tons to the sq. in., be alloyed with 10 p.c. of copper its tensile strength will be raised to 18 tons per sq. in., which is much higher than any calculation of the mean strengths of the two metals could give. The alloy is also usually harder than any of the principal metals composing it. The metal platinum is insoluble in nitric acid, but an alloy of platinum and silver is completely dissolved.

The most important alloys are the alloy steels, containing nickel, chromium, tungsten, and other metals in addition to carbon; the copper alloys such as brass (containing zinc) and bronze (containing tin); and the light alloys based upon aluminium and magnesium with up to about 10 p.c. of added metals, chiefly copper, zinc, nickel, silicon, and magnesium (Al. alloys) or aluminium (Mg. alloys). The demands of the aircraft industry for structural

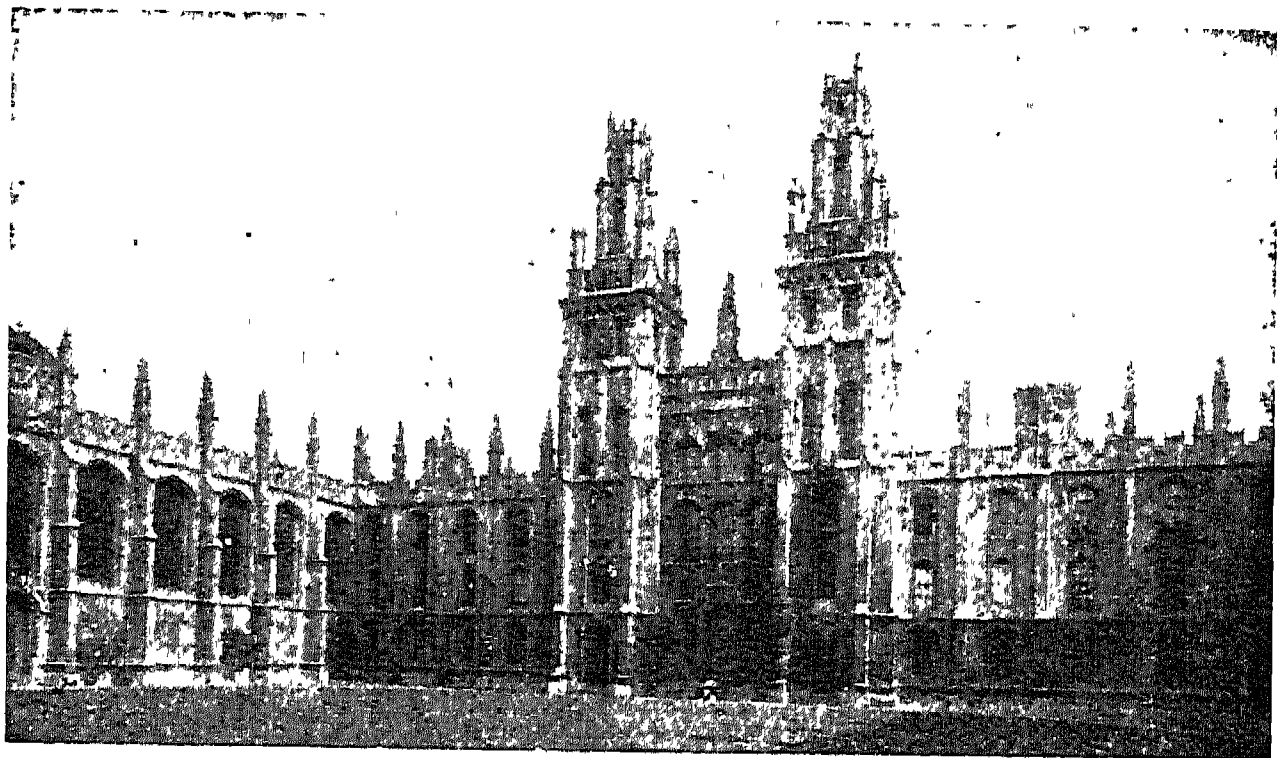
materials to give the highest possible strength/weight ratio have led to the development of alloys with specific gravities below 3 and with tensile strengths up to 40 tons per sq. in. in wrought form. Duralumin was the first of this class of alloy which depends for its remarkable properties upon some form of heat treatment, commonly known as age-hardening. Where metals of high melting point are involved, it is now common practice to produce alloys in finished form by means of powder metallurgy. In this process the metals in finely divided form are mixed together in the desired proportions and moulded into the finished shape in a steel die under high pressure. The articles thus formed are then heated to a temperature just below the fusion point, and "sintered" to form a compact mass by diffusion and recrystallisation. Metals and non-metals can also be bonded together in this way, but such a mixture can hardly be called an alloy.

Practically all the more important alloys used in industry are now covered by B.S.I. specifications which lay down the limits of composition and the

**All Saints' Day.** Festival of the Christian Church celebrated on Nov. 1, formerly called in Great Britain All-Hallows. It is in honour of all the saints and martyrs too numerous to be allotted a special day each, and was made a festival of obligation in 835 at the instance of Pope Gregory IV. It is sometimes said to date from 608, when the Pantheon at Rome was converted to Christian use. It is ordered to be observed in the Church of England. Many superstitions, dating from the pagan festival of Nov. 1, are connected in Scotland with Hallow-e'en, the vigil of All Samts'. In the Greek Church there is a similar festival on the Sunday after Pentecost.

**Allsopp.** Name of a family of Burton brewers. The founder of the business of Samuel Allsopp & Sons was Samuel Allsopp (d. 1838). His son Henry made it one of the greatest concerns of the kind in England. M.P. for Worcestershire from 1874 to 1880, Henry Allsopp was made a baronet in 1880, and in 1886 a peer as Baron Hindlip. He died April 3, 1887.

**All Souls College.** Oxford college, unique because it consists almost wholly of fellows, having only four undergraduates. Founded



All Souls College, Oxford, founded in 1438, in memory of Agincourt, and styled the College of the Souls of all the faithful departed

Frith

properties, while the more recently developed alloys, particularly the light alloys, are covered by D.T.D. specifications (issued periodically by the ministry of Supply), which also lay down heat treatment procedure and methods of test. Although most alloys are normally produced by melting together the metals of which they are composed, some alloys are produced by direct simultaneous reduction from their mixed ores or from an ore which contains them both. Monel metal is a typical example of the latter.

in 1438 by Henry Chichele, archbishop of Canterbury, its forty to fifty fellows include many men of great distinction. Some of them are chosen after examination; others are the holders of university professorships; while others are elected for special reasons or attainments. The head is called the warden, and the four undergraduates are known as bible clerks. The entrance is in Catte Street.

**All Souls' Day.** In the Roman Catholic Church, day set apart as one of prayer for the souls of all

of the Pearys and Cherrys, strawberry flowers (*fraises*) on that of the Frasers, while some of the Baines made use of crossed thigh bones.

**Alluvion** (Lat. *ad*, to; *luere*, to wash). Term used to describe additions to land bordering on the sea or a river caused by the imperceptible silting up of the soil. If the accretion is sudden, it is called dereliction. The increase due to alluvion belongs to the lord of the land to which the alluvion attaches; in dereliction the increase belongs to the crown.

**Alluvium.** Matter derived from the natural waste of rocks. It is carried by running water and deposited where the flow of water becomes insufficient to support the load. Alluvium will be deposited on the convex banks of meandering streams; at the point where a river enters a larger sheet of water, such as a sea or lake; and also over areas adjacent to rivers liable to floods. Marine alluvium is deposited on coastal platforms, forming beaches, and on tidal flats, forming salt-marshes.

**Allyl.** Term in organic chemistry used for compounds derived by the replacement of one atom of hydrogen in propylene by some other group. Allyl isocyanate (oil of mustard) and allyl sulphide (oil of garlic) are natural compounds.

**Alma.** River of Russia, in the Crimea. Its length is about 45 m., and it enters the Black Sea 18 m. N. of Sevastopol.

**Alma, BATTLE OF THE.** First pitched battle of the Crimean War, fought Sept. 20, 1854. On one side were 35,000 Russians under

Prince Menshikoff, and on the other 30,000 French under Marshal St. Arnaud, 25,000 British under Lord Raglan, and a few thousand Turks.

Having landed without hindrance on the Crimean Peninsula, the Allies set out for Sevastopol, some 20 m. away. To stop them the Russian army was drawn up on and behind the hills across the little river Alma, these being most precipitous at the right or seaward end. The plan was for the British and some of the French to advance against the Russian front, while the rest of the French with the Turks climbed the hills near the sea and turned the enemy's flank, this attack being supported by the fire of the warships, and being made along routes which the Russians thought impassable, at least to guns. The British divisions moved forward in line—riflemen in front, guns and cavalry on the exposed flank. Preceded by chasseurs, the French advanced in column, and a halt was called to give the flanking party time to get into position.

By this time the Allies were near enough to suffer many casualties from the Russian guns. Soon the advance was resumed. The unexpected appearance of the French on their flank alarmed the Russians, while other French divisions were moved away to the right to push home this advantage. Two British divisions, the Fusilier and the Light, therefore went forward alone against the Russian centre. They crossed the Alma without serious difficulty, and then the real struggle began. Under

heavy fire they pushed on past the burning village of Burluk, and some way up on the hill five battalions of Fusiliers seized a redoubt, from which after some desperate fighting the Russians hurriedly withdrew their guns. Before the supporting divisions, Guards and Highlanders, could get near, the Russians bore down on the five battalions, among whom a mistaken order to retire caused much confusion. This, however, was obeyed, but happily the reverse did not extend to the division on the left, which cleared the enemy from the hillsides. Falling back, the Fusiliers crashed into the Scots Fusilier Guards, who were thrown into disorder. But the other battalions marched on steadily; their fire told upon the enemy's columns; the French, after some delay caused by the congestion of men and guns on narrow hill-tracks, were moving forward; and the Russians soon began to withdraw. There was no real pursuit, but the Allies were in possession of the heights and could consequently claim to have won the day. The British losses were about 3,000 killed and wounded, largely incurred during the struggle for the redoubt. The French had about 1,400 and the Russians perhaps 6,000 killed or wounded. See *The Invasion of the Crimea*, A. W. Kinglake, 1863-87.

**Alma Ata.** Capital of Kazakh S.S.R. It lies at the foot of the N. slopes of the Ala-tau Mts., and is an important station on the Turk-Sib rly. It has railway repair shops, woollen mills, sugar refineries, and fruit-preserving



**Alma.** Battle of Sept. 20, 1854, when British and French troops attacked and defeated the Russians, who held the heights above the river, to bar the advance on Sevastopol. The mouth of the Alma is seen on the right

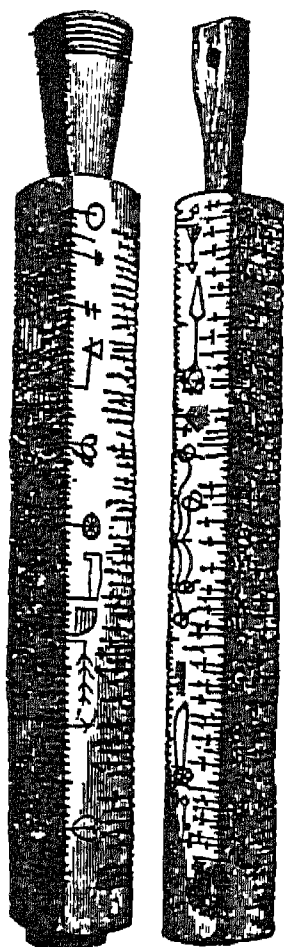


**Al-Mamun** OR ABDALLAH (c. 786-833). The seventh caliph of Bagdad. The second son of the caliph Haroun-al-Raschid, he was proclaimed caliph in 813, after serving as governor of Khorassan. A patron of letters and science, he made Bagdad a seat of learning, and died near Tarsus in Asia Minor.

**Almanac.** Year-book or table indicating the days of the week according to the months, together with astronomical, meteorological, and other data of value. The word almanac, thought to be of Spanish-Arabic origin, was used by Roger Bacon in his *Opus Majus* in 1268 and by Chaucer in *On the Use of the Astrolabe* in 1391. Sometimes called Ephemerides or Prognostications, the early printed almanacs were concerned with predictions, and among such were those of Leonard Digges, William Lilly, John Partidge, satirised by Swift, and Francis Moore. In Great Britain from 1710-1834 they were subject to a stamp duty.

Modern almanacs date from the starting by Charles Knight of *The British Almanac and Companion* in 1828, and the best contain a vast amount of miscellaneous information. The most noteworthy later almanacs include *The Nautical Almanac*, Whitaker's, Hazell's, Oliver and Boyd's, Thom's *Irish Almanac*, *The Almanac y Miloedd*, *Almanach de Gotha*, *Almanach Hachette*, *Connaissance de Temps*, *Berliner Astronomisches Jahrbuch*, and the *American Ephemeris and Nautical Almanac*. The prophetic almanacs survive in *Old Moore's*, *Zadkiel's*, and *Raphael's*.

Clog or log almanacs were oblong sticks of wood, brass, bone, or horn, with notches for the days of three months of the year on each of the four edges. They were flanked left and right with symbols indicating the lunar cycle, saints' days, etc., and made to hang on wall or mantelpiece or carry in the pocket. Supposedly of Scandinavian origin, they were still in use in the N. of England when, in 1686, Dr. Plot described them in his *Natural History of Staffordshire*.



Almanac,  
old clog forms

**Almanach de Gotha.** International book of reference issued in French and German. Established in 1763, it is published by the firm of Justus Perthes at Gotha, hence the name. It is in two main divisions, the first being devoted to the royal and noble families of Europe, while the second resembles *The Statesman's Year-Book*. In the first part the great families of Europe are divided into three classes: (1) reigning houses; (2) houses of Germany, formerly princes of the Holy Roman Empire; (3) other princely and ducal houses, including "the ducal houses of France, Belgium, Great Britain and Ireland, and many of the princely houses of Spain, Italy, and Russia." The second part contains statistics and names of the chief officials of all the countries of the world arranged in alphabetical order. In the John Rylands library, Manchester, there is a complete set of the German edition of the *Almanach* from 1764. It includes two copies for 1808, one suppressed by Napoleon and the other revised according to his directions. In 1945 the *Almanach* failed to appear for the first time for 181 years.

**Almandine.** Deep-red variety of the garnet, often having a violet tinge. Formerly known as the carbuncle, it is now called the precious or noble garnet. Good almandines closely resemble rubies, but are less hard, have a higher specific gravity (4.1 to 4.3), exhibit single refraction and no dichroism, and show the same colour in whatever light they are viewed. Almandine and zircon are the only precious stones exhibiting dark absorption bands in the spectrum. With almandine the dark bands appear in the green part, a phenomenon which can be observed by the help of a pocket spectroscope. Almandine spinels are red spinels with a blue or violet hue. These stones are found chiefly in Ceylon, Brazil, Tirol, the U.S.A., and Greenland. The word comes from Alabanda, a city of Caria in Asia Minor. See Garnet.

**Almansa** OR ALMANZA. Town of Spain, in Albacete province. It is 60 m. N.W. of Alicante by rly. from that town to Madrid, and has a ruined Moorish castle and an obelisk marking the site of the battle of 1707. Pop. 11,250.

**Almansa, BATTLE OF.** Fought April 25, 1707, between the English on one side and the French and Spaniards on the other. England was struggling against France, her object being to place

the Archduke Charles, instead of a French prince, on the throne of Spain. To assist him an army was sent to Spain, and the rival armies met at Almansa. The English and their friends were under a Frenchman, Ruvigny, whose English title was earl of Galway; the French and Spaniards were under the duke of Berwick. Ruvigny had with him about 15,000 men, of whom only a third were British, the rest being Portuguese, German, and Dutch; Berwick had about 25,000.

Berwick took up a position on some rising ground, with infantry in the centre and cavalry on the wings, and Galway, after a march of eight miles, came up to attack him. This first charge was successful, and the English regiments, horse and foot, drove the Spaniards from the field; but the French meanwhile attacked their right and soon overwhelmed the Portuguese battalions. Then the victors turned against the English, Dutch, and Germans, who, although outnumbered, fought desperately. Their position, however, proved hopeless, and after a time Galway managed to withdraw most of his men and save his guns. The British and their allies had about 4,000 killed and wounded, and lost 3,000 prisoners.

**Almansur** (c. 710-75). Surname, meaning the Victorious, of the second Abbaside caliph Abu Ja'far, the founder of Bagdad. He succeeded his brother Abul Abbas in 754, and his reign was marked by the loss of Spain and Africa and by the oppression of Christians in Syria and Egypt. For security against attack he left his old residence at Kufah and during 762-766 built a new capital, Bagdad, 90 m. to the N. of Kufah. He died while on pilgrimage to Mecca.

**Alma-Tadema, SIR LAURENCE** (1836-1912). Dutch-born British painter. Born at Dronrijp, Friesland, Jan. 8, 1836, the son of a lawyer, Pieter Tadema, he later added the name Alma (his godfather's patronymic) to his own. Originally destined for medicine, in 1852 he entered the Antwerp Academy, then under the direction of Baron Wappen, and later studied under the painter Baron Henri Leys (1815-69). In 1863 the Grosvenor Gallery organized a representative exhibition



Sir Laurence Alma-Tadema, painter  
R. Haines

region. It is cultivated in southern Europe and the Levant on account of its fruit, and in cooler parts for the sake of its flowers, which appear in advance of the leaves. Closely related to the peach, the fruit of the almond tree lacks the succulent flesh of the former, and the seed (the almond of commerce) is the only edible portion. The fruit consists of a downy leathery husk, which splits when the seed is ripe and exposes the hard, wrinkled stone enclosing the seed. The different kinds sold in the shops—the sweet, the bitter, and the thin-shelled Jordan—are cultivated varieties of the same species. It was introduced into Britain about the middle of the 16th century, and is cultivated as a beautiful spring-flowering tree or shrub, varying from 3 ft. to 12 ft. in height. The flowers are white,



**Almond.** The fruit of the Jordan almond as it grows; and (on the left) a nut without the leathery husk, and a kernel

pink, or red. The almond flourishes in ordinary garden soil and in open shrubberies and town gardens. It is pruned in winter by removing old branches.

**Almond.** River of Perthshire, Scotland. It flows 30 m. S.E. to join the Taysome 2 m. above Perth.

**Almond Oil.** Oil obtained from the seeds of the two varieties of bitter and sweet almonds. These yield a bland sweet oil by expression, and in addition bitter almonds yield on distillation a volatile or essential oil with a distinctive flavour.

To obtain the expressed oil the reddish-brown powder adhering to their surfaces is cleaned from the almonds, which are then ground or well bruised in a mortar or mill, enclosed in canvas bags, and subjected to pressure between polished steel plates which have previously been warmed. The oil

which drips from the bags is at first turbid, but by rest and filtration a clear straw-coloured oil is obtained, free from odour and with a slight nutty taste. The oil is extensively used in medicine. Sweet almonds yield 40 to 54 p.c. of oil, bitter almonds 38 to 45 p.c.

It thus appears more advantageous to use the sweet almonds for yielding oil, but as the expressed oil has to be removed from bitter almonds before the essential oil is distilled from them, it is usual to submit a mixture of the two kinds of almonds to pressure and then distil the residue for the sake of the essential oil contained in the bitter almonds. The last-named oil is present in bitter almonds to the extent of  $\frac{1}{2}$  p.c. The oil as distilled contains a small proportion of hydrocyanic acid, and, being largely used as a flavouring in cookery and confectionery, it is submitted to a process which frees it from this poisonous constituent, usually by redistilling with a mixture of lime and iron sulphate.

Peach kernels are also used for obtaining essential oils of almonds, the product being similar to that yielded by bitter almonds. Nitrobenzene, introduced as a substitute for essential oil of almonds, is used for perfuming soap. It can be distinguished from the natural oil by adding twice its volume of caustic potash; if nitrobenzene is present the mixture turns green.

**Almoner** (Gr. *eleēmosynē*, alms). Originally, the member of a monastery appointed to dispense the alms; later a similar functionary in the household of princes and ecclesiastics, e.g. the grand almoner of France. The British royal household has an almonry, comprising the hereditary grand almoner, the marquess of Exeter, the lord high almoner, and the sub-almoner. On Maundy Thursday the lord high almoner hands the royal alms to the sovereign for presentation; in the absence of the sovereign he dispenses them. At a coronation the hereditary grand almoner scatters the royal largesse in Westminster Abbey while the peers pay homage to the sovereign.

Many hospitals employ almoners. In private hospitals their duties include the determination of fees payable by patients. In health service hospitals their work is chiefly concerned with the social welfare of patients.

**Almora.** Town and district of Uttar Union, India. The town, capital of Kumaon division, lies 83 m. N. of Bareilly, on a ridge in

the Almora hills, 5,494 ft. high. For centuries an Indian stronghold, it came into British possession in 1815. The district, area 5,420 sq. m., produces tea. Pop. (1951) town, 12,116; dist. 23,538.

**Almoravides.** Mahomedan sect and dynasty of the 11th and 12th centuries. Converted to Mahomedanism and fired with its religious zeal, a tribe from the Sahara made war successfully upon its neighbours and in the 11th century conquered Morocco. They called themselves the Murabitin (hermits), a name altered in the course of time to Almoravides. Abu Bekr was their early leader, but it was under his kinsman, Yusuf-ibn-Tashfin, that they attained the height of their power. He founded the city of Marrakesh, Morocco, and in 1086 crossed over to Spain and there brought the various Moorish kingdoms under his authority. When he died, in 1107, his empire included all Spain and Portugal from the Ebro to the Tagus, considerable territory in N. Africa, and the Balearic Islands. Under his successors much of the European possessions passed to the Almohades, by whom their power in Marrakesh was destroyed. The city of Marrakesh was lost in 1147, a date marking the end of the Almoravides. See Morocco.

**Almqvist, KARL JONAS LUDWIG** (1793–1866). A Swedish author. Born at Stockholm, Nov. 28, 1793, when 20 he left a post in the civil service to found a cooperative farm colony, which proved unsuccessful. He took to teaching and to the composition of textbooks, turned author, and achieved fame as a writer of romance. In 1851 he was charged with forgery and murder, and fled to America. Returning to Europe in 1865, he lived under the name of C. Westermann at Bremen, where he died Sept. 26, 1866. His best known work is the group of novels called *The Book of the Thorn-Rose*, 1832–35.

**Almshouses.** Homes provided in England by individual philanthropists, city companies and trades for the aged poor. Usually they consist of separate tenements. When on the dissolution of the monasteries the almonries of these institutions disappeared, the foundation of almshouses became a common form of benevolence, usually under the name of hospitals, a term still used in Scotland.

A notable English almshouse is the Charterhouse (*q.v.*), founded in 1611. Near Winchester is the Hospital of S. Cross, founded



**A.L.O.E.** A Lady of England, pseudonym of Charlotte Maria Tucker (*q.v.*), writer of books for children.

**Aloe.** Extensive genus of the family Liliaceae. It consists of succulent shrubs (rarely trees) with thick, fleshy leaves margined with prickles or teeth. The numerous tubular flowers are sex-partite and arranged in erect racemes. They are plants of hot, dry countries, particularly of S. Africa, their organization being adapted to growth under such conditions, the leathery texture of the skin hindering rapid evaporation of moisture from the leaves. Several species of the plant are of economic importance, the drug aloes being the dried resinous juice from the leaves of *Aloe vera* and *Aloe Socotrina*, that from the former being known as Barbados aloes and the latter as Socotrine aloes.

**Aloes.** Juice of various species of the aloe, evaporated to dryness. It occurs in commerce in masses of a yellowish-brown colour. The most important constituent is a crystalline principle called aloin. Combined with nux vomica and ferrous sulphate, aloes is often useful in simple anaemia. It is an excellent intestinal purgative in cases of chronic constipation, and is most frequently administered in the form of a pill. Aloes is contained in the compound rhubarb pill, the compound colocynth pill, and the compound pill of colocynth and hyoseyamus.

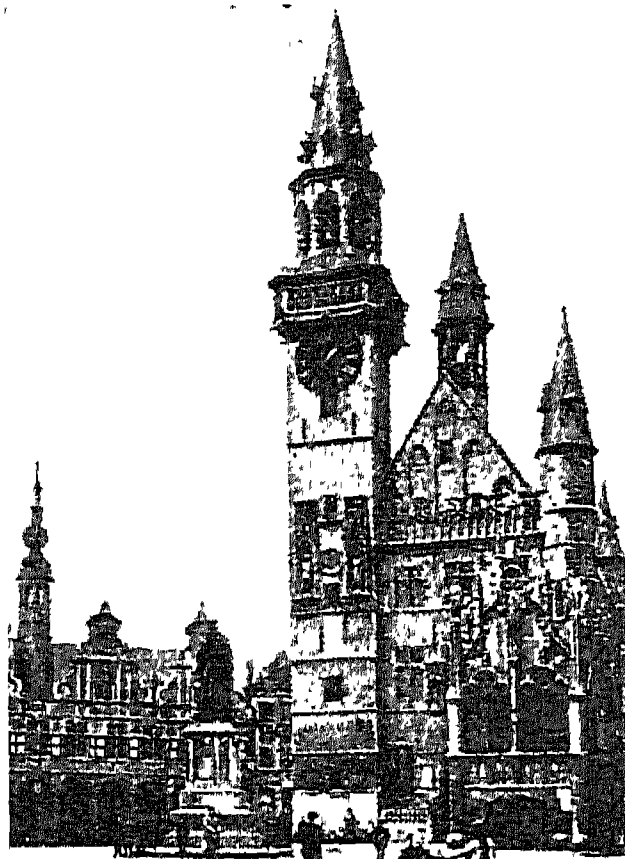
**Along** or **HALONG.** Bay of the Gulf of North Vietnam, Indo-China. It is sheltered by Cac-Ba Island on the S.W.

**Alopecia.** Medical term for baldness (*q.v.*).

**Alor Star.** Chief town and seat of government of the state of Kedah, Federation of Malaya. Situated on the coastal plain 7 m. inland from the W. seaboard and 28 m. S. of the Siam border, it is on the main W.-coast rly. from Bangkok (Siam) to Singapore. There are air services to the principal towns of the federation connecting with trunk lines at Singapore; the airport was enlarged to handle jet aircraft, 1955. Alor Star is the centre of an important rice-growing area and sea and river

fishing industry. It has a fine mosque, govt. buildings and rest house. In the grounds of the Istana (sultan's palace) is a small zoo open to the public. Pop. (1947) 11,844.

**Alost** (Flem. Aalst). Town of Belgium, in E. Flanders. It stands on the navigable Dender, 19 m. by



Alost. The 13th-century Hôtel de Ville of the old Flemish town

rly. W.N.W. of Brussels, and has a magnificent, but unfinished, church, S. Martin's, a 15th-century town hall, and a Jesuit college. It has bleaching works and manufactures textiles, leather, beer, and spirits. After heavy fighting at the outset of the First Great War, Alost was occupied by the Germans from Oct., 1914, to Nov., 1918. It was again occupied



Alpaca. South American animal of the camel family, the hair of which is used for making a material of the same name

Gambier Bolton, F.Z.S.

by them in their drive W. from Brussels, May, 1940, remaining so until liberated by the British 2nd army, Sept. 4, 1944. Pop. (1947) 41,960.

**Aloysius** (1568-91). Italian saint. Luigi Gonzaga was the son of Ferdinand, marquis of Castiglione, and was born March 9, 1568. Conspicuously devout from earliest boyhood, he resigned his title in 1585, joined the Society of Jesus, taking the name of Aloysius, and died while ministering to the sick during a plague epidemic in Rome, June 21, 1591. He was beatified by Gregory XV in 1621, and canonised by Benedict XIII in 1726. He is a patron saint of schoolboys.

**Alpaca** (*Auchenia pacos*). Domesticated breed of the wild guanaco, a South American mammal of the camel family, without a hump but possessing the "water stomach." The alpaca has a fleece of thick woolly hair almost 2 ft. long. It was found wild in flocks on the central Andes, domesticated before the arrival of the Spaniards, and bred for its fine long wool.

The alpaca somewhat resembles a sheep in appearance but has a long neck which it carries erect. About 8 ins. of the fleece is sheared each year; the wool is usually dark brown or black, with small quantities of grey or white. Of the four indigenous South American fibre-bearing animals of the camel class, the guanaco, the llama, the alpaca, and the vicuña, the alpaca is perhaps the most valuable on account of the quantity and lustre of its fibre.

The British trade in alpaca wool dates from 1836, and owes its development to Sir Titus Salt, who manufactured the wool into cloth in his mills at Bradford. The 13th earl of Derby had a herd of alpacas at Knowsley, and hoped, but failed, to acclimatise the animal for commercial development.

Alpaca material, originally used as a substitute for mohair, which it resembles, is soft to the touch and of fair lustre. It is usually dyed black. Alpaca dress goods and linings are made with a cotton warp and an alpaca weft.

**Alp-Arslan** (c. 1029-72). Surname, meaning brave lion, of Mohammed ben Daud, second Seljuk sultan of Persia and nephew of Togrul Beg. He became ruler of Khorassan in 1059 and sultan of Persia in 1063, and extended his dominions by the invasion of Armenia and Asia Minor. In 1071 he captured the

symbols for some sounds; they represent these, when they are required, by symbols expressing somewhat similar sounds, by combinations of two or more letters, by additional letters borrowed from other alphabets, by the addition of diacritical points or other marks (inserted above or under the letter, to its right or its left, or inside it), by using inverted letters, or by the invention of new letters, etc. On the other hand, most existing alphabets contain redundant letters.

#### Ways of Expressing the Same Sound

Moreover, nowadays many sounds are represented quite differently in various national alphabets. The double sound *shek* (as, for instance, in Ashchurch), which in Russian is represented by one sign (Ш), is denoted in Czech (another Slavonic language) by the combination of two signs (šč), in Polish (also a Slavonic language) by four consonants (*szcz*); while in German seven consonants (*schtsch*) are needed for the purpose. The English alphabet (like many other alphabets) has no single symbols to represent the sounds *ch*, *sh*, *th*, etc. Some letters are used for two or more distinct sounds (*c* for the letter *k* in cross, crown, credit, etc.; for the sound *s* in ceiling, census, decide, etc.; in addition to entering into the combinations *ch*, *ck*, *cz*). The letters *q* and *x* are of small service in English, and are virtually redundant, *q* in true English words appearing only in the combination *qu* (which can be replaced by *kw*), and *x* representing the sounds *ks*.

#### ORIGIN OF THE ALPHABET.

No other system of writing has had so extensive, so intricate, and so interesting a history as the alphabetic. In its broad lines, the story of alphabetic writing from the end of the second millennium B.C. until today is not very hard to trace; but many details of its origin and of the origin of some individual alphabets are uncertain.

Various theories have been advanced from time to time, since classical antiquity, in efforts to explain the origin of the system. The Phoenician, the Egyptian, the Mesopotamian, the Cretan, and other scripts have at one period or another, by one scholar or another, been considered the prototypes of alphabetic writing. About 1916, the palaeo-Sinaitic theory—based on inscriptions belonging to the mid-second millennium B.C., discovered after 1905

in the Sinaitic Peninsula—came into favour. Sir Alan Gardiner (whose theory is accepted by many scholars) regards the Sinaitic inscriptions as representing a stage of writing intermediate between Egyptian hieroglyphics and the Semitic alphabet. But Gardiner's classical identification of the name of the goddess Ba'alat is the only probable one amongst all the tentative decipherments, interpretations, and comment on the Sinaitic inscriptions. Indeed, these inscriptions do not provide sufficient material for a true decipherment, any more than they can help to solve the problem of the origin of the alphabet.

The solution of the enigma may come from Palestine, where several Bronze Age inscriptions have been discovered since 1929. The importance of these documents is paramount, but their significance seems to have been rather distorted by various scholars, according to whom the writing in these inscriptions, termed for convenience the Early Canaanite script, constitutes an important "missing link": that is, it represents the intermediate stage between the palaeo-Sinaitic and the North Semitic scripts. It appears that three of the Early Canaanite inscriptions, belonging to the 18th or 17th century B.C., are about two centuries older than the palaeo-Sinaitic. It follows that the palaeo-Sinaitic script cannot be regarded as the great mother alphabet, and that the three Early Canaanite inscriptions may be considered the extant *incunabula* of the early alphabetic writing.

#### Early Canaanite Script

It is, however, possible that the Early Canaanite script represents not the mother alphabet but only one of the efforts of the second millennium to introduce an alphabet. Indeed, other such efforts are known—among them the script of the pseudo-hieroglyphic inscriptions found in Byblos (northern Syria), and the scripts of a few enigmatic inscriptions brought to light in northern Egypt and at Balua' (Moab, Jordan). Of particular importance is the cuneiform alphabet of Ugarit (modern Ras Shamrah, in northern Syria); on this famous site, since 1929, have been found thousands of clay tablets, which proved to be documents of inestimable value in many fields of research, e.g. epigraphy, philology, history of religion, and the study of the Bible.

The most probable theory of

the origin of the alphabet appears to be that which considers the North Semitic alphabet an indigenous, more or less original, invention of the north-west Semitic population of Syria and Palestine. This invention was partly facilitated by the fact that the inventing mind—whether of an individual or of a school—was acquainted with the various scripts in these and surrounding countries. It may be argued that the original Semitic or North Semitic alphabet arose in, or rather before, the mid-second millennium B.C.

#### One Sound—One Sign

At any rate, the great feature of the invention was not the creation of the signs. Its real achievement consisted in the production of a purely alphabetic system, which denoted each sound by one sign. For this achievement, simple as it may seem, the inventor or inventors are to be ranked among the greatest benefactors of mankind. No other people in the world has been able to produce a true alphabetic system.

**SOUTH SEMITIC ALPHABETS.** This group of alphabets is the only one whose exact relationship with the North Semitic alphabet has not yet been established. The South Semitic branch remained, generally speaking, confined within Arabia, where (in the first millennium B.C. and the early centuries A.D.) the following scripts developed: Minaean, Sabaean, Himyaritic, Qatabanic, and Hadhramautic, in south Arabia; Thamudene, Dedanite, Lihyanite, and Safaitic, in north Arabia. The Sabaean script spread into the African continent and became the progenitor of the Ethiopic alphabet, which is the mother script of the modern alphabets of Abyssinia (Amharic, Tigré, Tigrña, Galla, etc.), the only South Semitic offshoots still in use.

**MAIN ALPHABETIC BRANCHES.** The North Semitic alphabet remained almost unaltered for many centuries. Moreover, if the external form of the letters be ignored, and only their phonetic value, their number, and their order be considered, modern Hebrew may be regarded as a continuation of the original North Semitic alphabet.

The main characteristic of the North Semitic alphabet is that it consisted of 22 letters or symbols, which correspond roughly to the first 22 letters of its descendant, the Greek alphabet. The method of writing used was uniformly



from right to left. The 22 letters expressed consonants only, though some of them came to be used as vowels.

#### Names of the Letters

Both the names and the sounds of the letters of the North Semitic alphabet rest mainly on tradition. The names are preserved in the modern Hebrew alphabet. Although the names of the modern Hebrew letters probably do not correspond exactly to those of the ancient Semitic script, the differences do not seem to be very important. The following are the modern Hebrew letter-names: 'aleph, beth, gimel, daleth, he, waw, zayin, heth, teth, yodh, kaph, lamed, mem, nun, samekh, 'ayin, pe, sade, qoph, resh, shin, taw. Thus, nearly all these names end with a consonant, whereas the Greek letter-names that are derived from the Semitic ones end with a vowel (*alpha*, *beta*, *gamma*, *delta*, and so on).

While the Greek letter-names are meaningless in Greek, the Semitic ones are words in the Semitic languages. Generally the Semitic names of the letters refer variously to: everyday objects, such as house (*beth*), door (*daleth*), hook (*waw*); parts of the body, hand (*yod* for *yad*), palm or open hand (*kaph*), eye (*'ayin*), mouth (*pe*), head (*resh* for *rosh*), tooth (*shin* for *shen*); animals, ox (*'aleph*), camel (*gimel* for *gamal*), monkey (*qoph*), fish (*nun*, or *samekh* for *samak*): also water (*mem* for *mayim*). Each letter-name designates both the sound and the letter with which it begins (*beth* is the name for *b*, *gimel* for *g*, *daleth* for *d*, etc.) The name of the last letter of the Semitic alphabet is simply sign or mark (*taw*). Some letter-names have not been explained satisfactorily (*he*, *zayin*, *heth*, *teth*, *lamed*, *samekh*, *sade*).

About 1000 B.C., the following three main branches arose out of the North Semitic alphabet: the Canaanite, the Aramaic, and the Greek. The Canaanite branch soon subdivided into the Early Hebrew alphabet and the Phoenician alphabet, used by the ancient Phoenicians in their mother country and in their numerous colonies, particularly at Carthage. The alphabets used at Carthage are called Punic (pre-Roman times) and neo-Punic (Roman period). The ancient Libyan and Iberian scripts descended from the Phoenician alphabet or its variants.

The Early Hebrew alphabet (which is quite different from the

"Square Hebrew," ancestor of the modern Hebrew alphabet) was used in the pre-Exilic period, that is, until the 6th century B.C., but it lingered on till the Christian era. It was the original script of the Bible, the writing used by the Hebrew kings and prophets. The Moabite, Ammonite, and Edomite alphabets were strictly related to the Early Hebrew alphabet. The Jewish coin-script (140 B.C. to A.D. 135) and the Samaritan alphabet (still used for liturgical purposes by the Samaritan sect in Palestine) were its direct descendants.

**ARAMAIC BRANCH.** In the history of the alphabet, the Aramaic branch occupies a place comparable with that of the Latin alphabet. The Aramaic alphabet probably originated in the 10th century B.C., and in the second half of the same millennium it became by far the most important and widespread script of the whole of western Asia (see also Aramaic Language). In the same period and during the following centuries numerous Aramaic offshoots became distinct entities. In the course of time hundreds of scripts used in the East sprang from the Aramaic branch.

#### Descendants of Aramaic Branch

The direct and indirect descendants of the Aramaic alphabet are divided into two main groups: (1) scripts used for Semitic languages; (2) scripts used for non-Semitic languages. The first consists of the following subdivisions: Hebrew, Nabataean-Sinaitic-Arabic, Palmyrene, Syriac-Nestorian, Mandaean, and Manichaean. In nearly all of them the alphabet used followed the religion practised.

The scripts of Aramaic descent used for non-Semitic languages can be distinguished as belonging to eight main groups: (1) Kharoshthi, in N.W. India, E. Turkistan, E. Afghanistan; (2) Persian or Iranian scripts called the Pahlavi alphabets, including the Avesta alphabet; (3) Sogdian, a language and script which in the second half of the first millennium A.D. were the *lingua franca* of central Asia; (4) Kōk Turki, in S. central Siberia, N.W. Mongolia, N.E. Turkistan; and the Early Hungarian alphabet; (5) Uighur, in Mongolia and E. Turkistan; (6) Mongolian, including Kalmuck and Buriat and the allied Manchu alphabets; (7) Armenian, Georgian, and Caucasian; Albanian; and (8) Brahmi, the great mother alphabet of about 200 scripts now

used in north and south India, in Ceylon, Burma, Cambodia, Cochin-China, Siam, Indonesia, and, to some little extent, as far as the Philippine Islands. Even the Korean alphabet, called Ōn-mun, the only native alphabet of the Far East (Chinese and Japanese being written in ideographic scripts), was indirectly derived from the Indian branch.

**WESTERN ALPHABETS.** The importance of the Greeks in the history of alphabetic writing cannot be over-estimated. Nearly all the alphabets in use today stand in direct or indirect relation to the ancient Greek. Although the Greeks did not invent the alphabet, they improved it to such a degree—transforming the purely consonantal Semitic script into a modern alphabet, giving it symmetry and art—that for three thousand years it has furnished a most convenient vehicle of communication and expression for the thoughts of men of many tongues, creeds, and origins.

Out of the troubled darkness which shrouded the transition from the Bronze Age and the Mycenaean civilization to the Iron Age and the early Greek primitive geometric art of the 9th century B.C., there came the civilizing influence of the Greek alphabet. Greek tradition, generally speaking, expresses the view that the Greeks learned the art of writing from the Phoenicians, and all serious scholars are inclined to accept this view. But there are many conflicting opinions regarding the date when the Greek alphabet came into being. Some scholars place it as early as the 15th century B.C., others as late as the 7th. The favoured century is the 9th B.C.

#### Earliest Greek Script

Like all the Semitic alphabets, the earliest Greek script was written from right to left, a style which was later superseded by the *boustrophedon* style (a Greek term meaning alternately from right to left and from left to right, as the ox draws the plough). After 500 B.C., Greek writing invariably proceeded from left to right and from top to bottom. From the classical, monumental alphabet—always used for inscriptions—there sprang the Greek uncial script, the cursive hand, and the minuscule, consciously adapted as a book-hand about A.D. 800. Out of the cursive hand there gradually developed (partly under the influence of the Latin script) the modern Greek minuscule. The

apparatus shown in fig. 1. A quantity of radon was compressed in tube A, with walls thin enough to allow the penetration of  $\alpha$ -particles into the outer tube B. Tube B was evacuated at the beginning of the experiment. After several days the gas which had accumulated in it was compressed into the discharge tube C, where a spectroscopic examination showed the presence of the spectrum of helium.

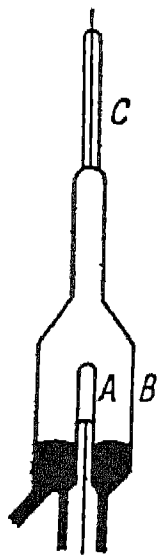


Fig. 1

According to later theories, the  $\alpha$ -particle is composed of two protons and two neutrons. It is a very stable structure with a binding energy of 28.3 MeV. Since for heavy elements the binding energy per additional nucleon is about 5.5 MeV, the emission of an  $\alpha$ -particle is energetically possible. This explains the spontaneous disintegration of the natural radio-active substances with emission of  $\alpha$ -particles of energies from about 4 to 9 MeV. The probability of emission of an  $\alpha$ -particle depends on the thickness of the Coulomb potential barrier to be penetrated.

When traversing matter the  $\alpha$ -particle gradually dissipates its energy in ionising the atoms through which it passes; an  $\alpha$ -particle of an initial energy of 6 MeV produces about  $2 \times 10^5$  ions along its path. The specific ionisation, i.e. the number of ions per unit length, increases as the velocity of the  $\alpha$ -particle decreases (fig. 2). The track

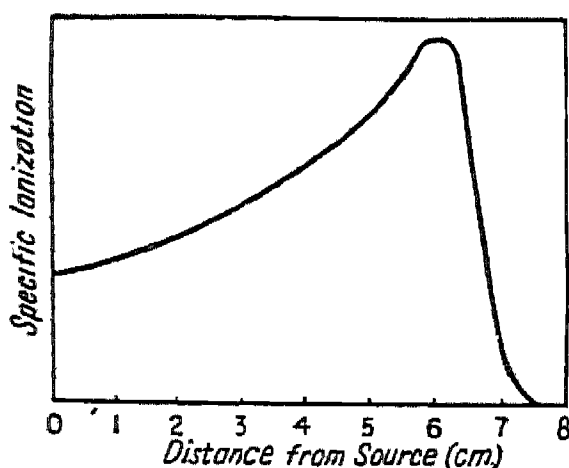


Fig. 2

of each particle is rectilinear until all its energy is used up, when it comes to a sudden halt. Fig. 3 shows the variation in the number of particles in a collimated beam as a function of the distance travelled in a gas near the end of its range. The "straggling" of the range is due to statistical fluctuations in the energy loss of individual particles in the beam; the mean range is the distance at which the number of particles is reduced to one-half.

For the  $\alpha$ -particles from radioactive substances, the mean range in air at N.T.P. varies from 2.5 to 8.6 cm. In solid matter the ranges are much shorter; an ordinary sheet of writing paper is sufficient to stop all  $\alpha$ -particles.

Occasionally an  $\alpha$ -particle passes sufficiently near the nucleus of an atom to be scattered through a large angle. It was the observation of this scattering that led Rutherford to the concept of the atomic nucleus. The scattering follows Coulomb's law except for light elements in which deviations due to the action of the nuclear forces are observed.

Alpha-particles were the first projectiles used to cause the artificial transmutation of nuclei. Later, particle accelerators were used to

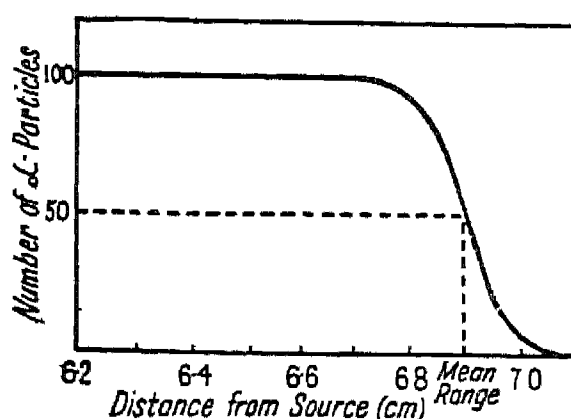


Fig. 3

produce beams of fast protons or deuterons. Helium nuclei also can be accelerated in this way, and artificial beams of  $\alpha$ -particles of energies up to 400 MeV have been produced. Consult Radio-activity and Radio-active Substances, J. Chadwick, 1953.

**Alphege** OR ALPHAGE (954-1012). English archbishop, saint, and martyr. After having been a monk at Deerhurst and also an anchorite and abbot at Bath, he was made bishop of Winchester in 984 and archbishop of Canterbury in 1005. He laboured at the conversion of the Northmen, and among his own people for the abolition of slavery. Captured by the Danes at Canterbury in 1011, he refused to raise money for ransom from his tenants, and was murdered April 19, 1012. He was buried in S. Paul's Cathedral, but his body was removed in 1023 to Canterbury. He was declared by Anselm a saint and martyr. The parish church at Greenwich is traditionally identified with his place of martyrdom.

**Alpheus.** The chief river of Peloponnese, Greece. The modern Ruphia, it rises in the S.E. of Arcadia, and flows past Olympia to the Ionian Sea. It is associated with the legend of the pursuit of the nymph Arethusa (*q.v.*) by the river god Alpheus.

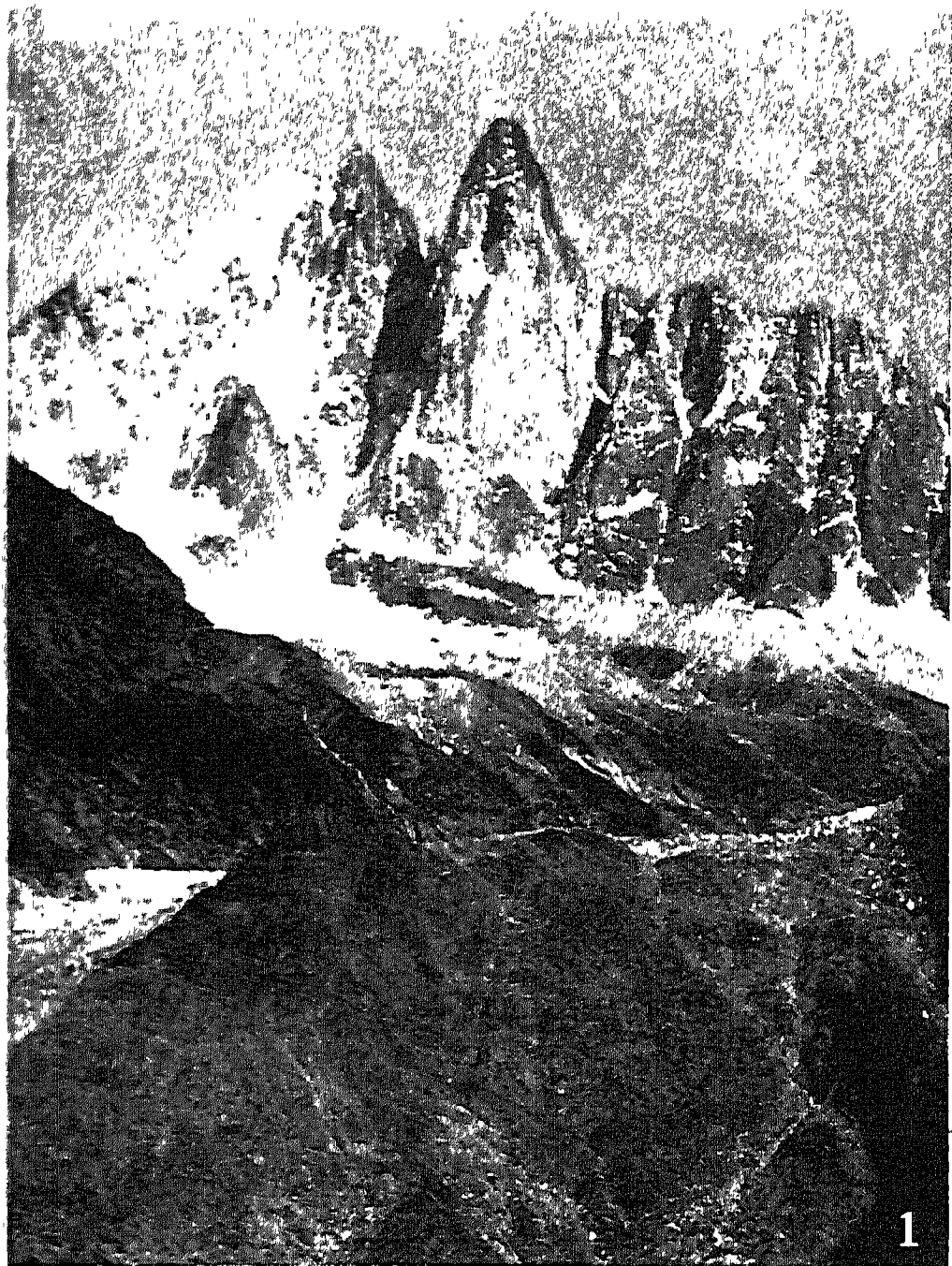
**Alphonso** OR ALFONSO. Name of more than 20 rulers of the old Spanish kingdoms (and of territories now in southern France), of whom 13, kings of Leon and Castile, are also reckoned as kings of Spain: name also of six kings of Portugal. The most notable, in chronological order, were as follows:

**ALPHONSO III** of Spain, the Great (d. c. 914), was king of a north-western territory variously called Galicia, Oviedo, Asturias, and Leon. This domain, inherited from shadowy forebears, was the ghost, or perhaps an unconquered vestige, of the Visigothic kingdom overthrown in the 8th century by the Saracens or Moors, against whom Alphonso III waged constant war.

**ALPHONSO VI** of Spain, the Brave (1030-1109), was a son of Ferdinand I of Leon, Castile, and Galicia, on whose death he received the kingdom of Leon. He quarrelled with his elder brother Sancho, king of Castile, and was compelled to take refuge with Al Mamun, the Moorish king of Toledo. On Sancho's assassination in 1072, Alphonso returned to Leon and reunited the three kingdoms under his rule. He introduced the Cistercian order of monks into Spain, and ended the isolation of the country from Christendom as a whole. He banished the Cid (*q.v.*) from Castile, and appears in romances of chivalry attached to that hero's name and to his own. In 1084, after Al Mamun's death, Alphonso took Toledo. His reign marks an important stage in the reconquest of the peninsula from the Moors.

**ALPHONSO THE WARRIOR** (1104-34), king of Navarre, was also Alphonso I of Aragon and for some years Alphonso VII of Leon and Castile, although his stepson Alphonso the Emperor (1126-57), who succeeded him in Leon and Castile only, is usually reckoned to be Alphonso VII in the main Spanish line of succession (this king's title of emperor refers only to a tradition or pretension of the kings of Leon that they were senior to all other Spanish rulers). Alphonso the Warrior married Urraca, daughter of Alphonso VI, but quarrelled with her to the point of warfare; Pope Calixtus II annulled the marriage as being between third cousins, and Alphonso lost the kingdoms she brought to him. He earned his own distinctive appellation by constant campaigning, which included 29 battles; his chief successes against the Moors were the capture of Saragossa,

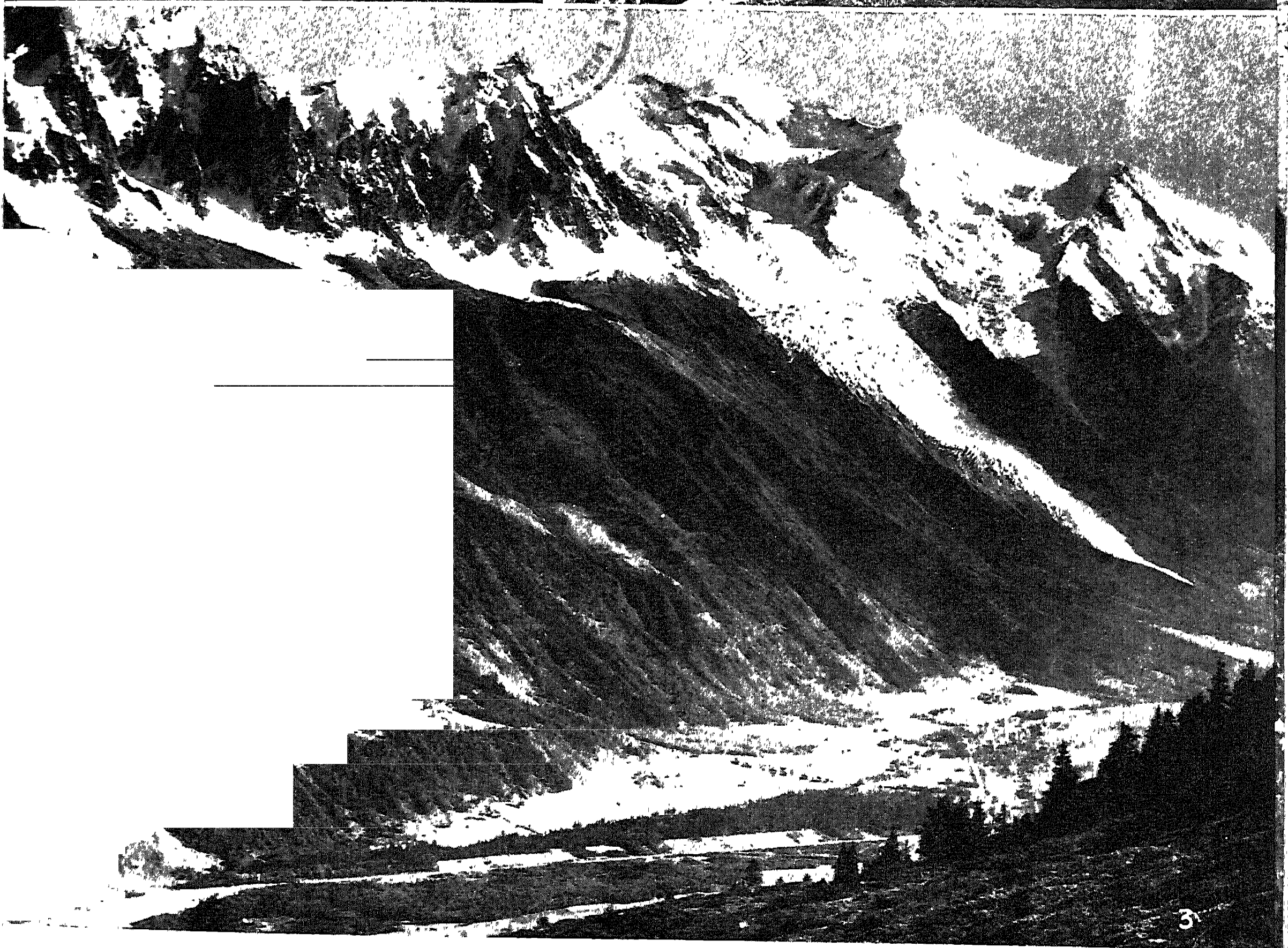




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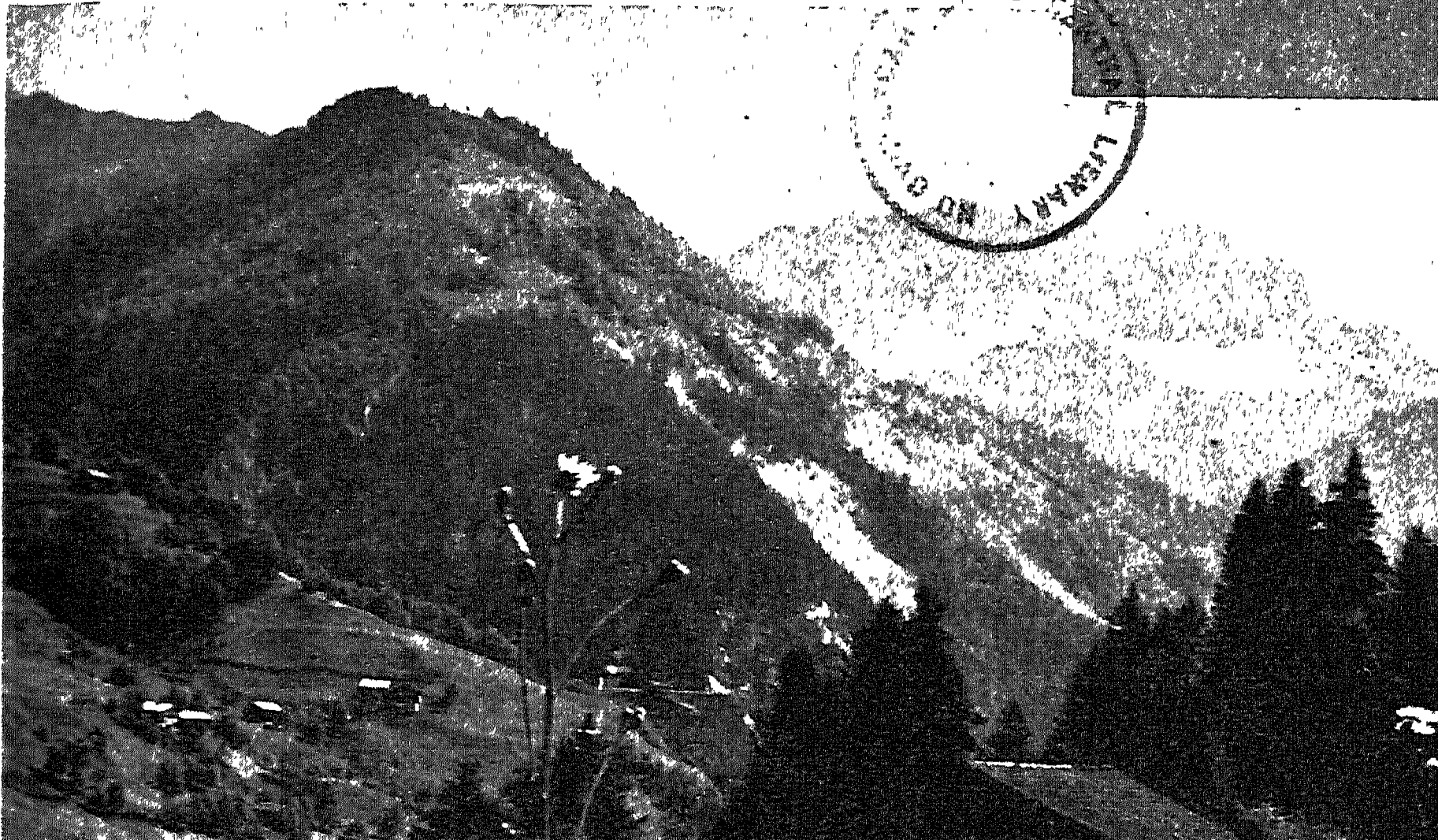
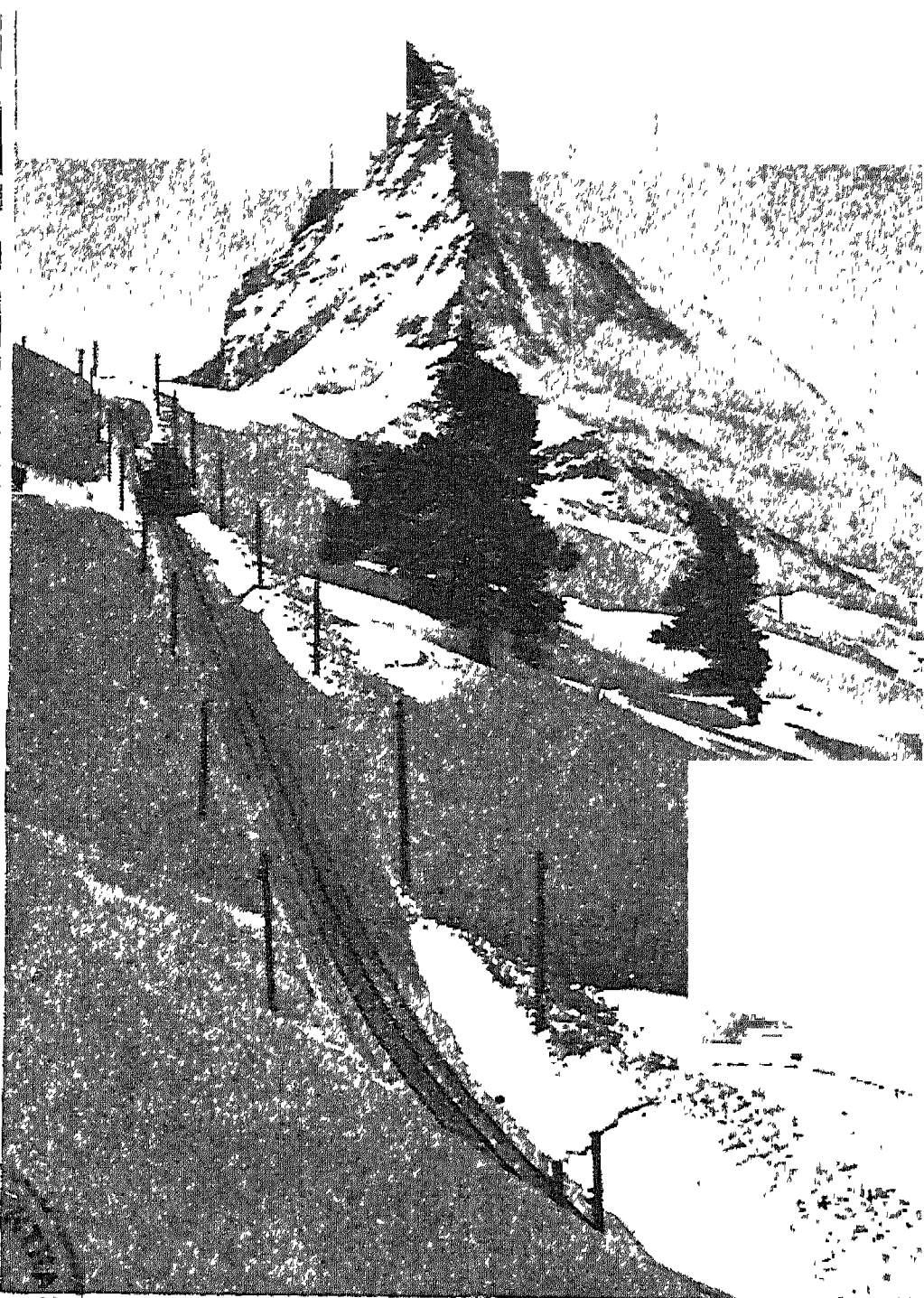
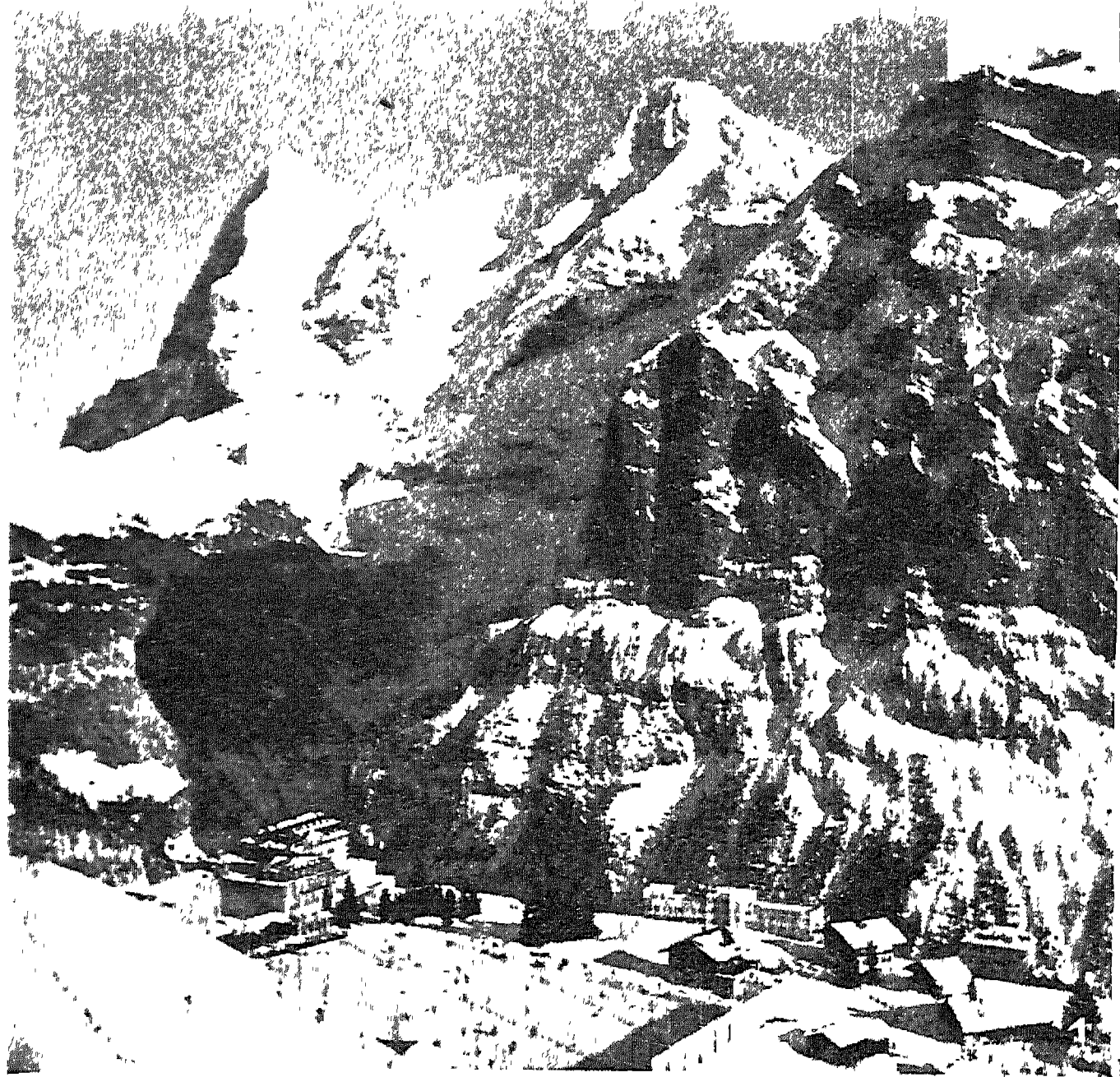
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The Mont Blanc range rises at the border of Haute Savoie, France, and Piedmont, Italy. 1. Steep-sided peaks of the Aiguille Verte and the Aiguille du Dru. 2. The Mer de Glace, famous glacier over nine miles long. 3. General

view of this great chain of the Alps, with Chamonix lying in the valley below; the summit of Mont Blanc itself (marked x), 15,781 ft. high, is in France, the first recorded ascent was made in 1786 by two natives of Chamonix

# ALPS: WESTERN AND LOFTIEST SECTION OF EUROPE'S GREAT MOUNTAIN SYSTEM





1. Eiger, 13,042 ft., and Mönch, 13,468 ft., two peaks of the Bernese Oberland; below lies Murren. 2 The Matterhorn in winter showing a rack railway for ski-ers; this sharp and distinctive peak rises to a height of 14,782 ft. On

account of the difficulties and dangers of ascent, it is the most respected of all Alpine peaks. 3. Summer in the Engadine, the upper portion of the Inn valley, Switzerland; in the distance is the mountain called the Drusenfluh

# ALPS: TOWERING SNOW-CLAD SUMMITS AND FLOWER-DECKED VALLEYS



## ALPS: MOUNTAIN REGION OF EUROPE

*Below is described geographically and historically the mountainous system of south central Europe. Reference is also made to Alpine climbing and literature. See also Dolomites; Geology; Mountaineering; Tirol; Switzerland, etc. Map on page 335*

The term Alps is generally used to denote the ranges and groups of lofty mountains in the S. of central Europe, bounded, roughly speaking, on the S. by the Italian plains, on the W. by the Rhône valley, stretching E. almost to the plains of Hungary, and on the N. descending to the less elevated but still hilly country of N. Switzerland, Bavaria, and Upper Austria. They are usually treated as divided into three main sections, the W., Central, and E. Alps. The W. Alps include the Maritime, Cottian, Dauphiné, and Graian Alps; the Central Alps include the Bernese Oberland on the N. and the Pennine Alps on the S. of the upper Rhône valley, the Lepontine, and Adula Alps, Tödi range, N.E. Swiss and the Bernina Alps, and Rhaetian Alps; the E. Alps extend through E. Tirol and Styria and the N. of Venetia and end in the Carinthian, Carnic and Julian Alps.

### Meaning of the Word Alps

To represent the Alps as a single defined chain is utterly misleading. It should be noticed that, as used in this mountainous district itself, the word *alps* does not mean the peaks or mountain ranges, but upland pastures where cattle and goats graze in summer. Rising from the hot low valleys through vineyards on the S. slopes, past the deep gorges through which the torrents force themselves under pine woods or, on the Italian side, groves of chestnuts, a region of clear air, flowers, green pastures, and clear springs is reached; here, too, the peasants have built chalets with the rocks and snowfields above and ravines, woods, and valleys below. So there are Wengern Alp, Riffel Alp, Bel Alp, Engstlen Alp, and hundreds of others on the sides of the higher mountains which have become the playground of Europe.

The region of these Alps is from about 5,000 ft. to 7,000 ft. or more above the sea level: the high mountain peaks rise above them to a height of from 10,000 ft. to 15,000 ft. The few over 14,000 ft. occur only in the group of Mont Blanc, of the central Pennines in the Zermatt region, and one, the Finsteraarhorn, in the Bernese Oberland. The highest peaks of the Alps, further E., viz. the Ortler Spitze, the Gross Glockner, the Gross Venediger, and the Wildspitze, range between 11,000 ft. and 13,000

ft. While only two summits in the whole region are over 15,000 ft. high, there are dozens over 12,000 ft., from Monte Viso in the far W., on the border of Dauphiné and Piedmont, to the Gross Glockner in the E., and many scores over 10,000 ft., in both the main chain and outlying groups.

### The Building of the Alps

How was this mountain region, with its infinite variety—a terror to the ancient world, a joy to the modern—formed? Volumes have been written on the subject, elaborate researches made, theories propounded. It seems that the region was first elevated by forces from below. As the earth cooled and its crust contracted, strata, which at first may have been horizontal, were squeezed together by lateral thrusts, often crushed, one part elevated, another depressed. To quote Prof. Bonney, whose work on the Building of the Alps should be carefully studied by all interested in the subject, "Such a chain as the Alps may be described as composed of a series of rock masses, in part at least deposited in successive layers, and then bent into wave-like folds, as a number of heavy carpets laid one on another would be if their opposite ends were brought (pushed) nearer together. These folds are sometimes comparatively gentle, sometimes exceedingly sharp. Occasionally the thrust is so powerful that the folds are bent over in the opposite direction; sometimes the rock masses are even broken under the strain and the upper part of the fold slides forward over the lower. While these disturbances were in process, heat and cold, rain and river, snowslide and glacier, in some cases also waves of the sea, were sculpturing and transporting, so that the mountain peaks are in many cases only remnants of masses far more gigantic; that vast rocky wall which rises so grandly against the sky is a mere ruin of the huge bulwark which once guarded the Italian lowland."

The Alps that from a distance look so still, white with their eternal snows, immutable in their adamant strength, are really never at rest. Even the stillness of night is broken by the roar of the torrents carving their courses deeper and deeper and bearing with them the stones and sandy

silt which they will deposit in the valleys below, by the thunder of the avalanche, the hissing and howling of the wind among the peaks, and the loud report of breaking ice. "I am well persuaded," says Ruskin, "that the more familiar anyone becomes with the chain of the Alps, the more the idea will force itself upon him of their being mere remnants of large masses, splinters and fragments as of a stranded wreck, the greater part of which has been removed by the waves."

The varying shapes of the higher peaks, whose sharp edges and points show them to have been above the action of glacial ice, are due partly to the influences to which they have been subjected, and partly to the different characters of the rock of which they are compounded. The higher summits are principally of gneiss or mica schist, and sometimes of granite. These older crystalline rocks are flanked by rocks of later origin and include limestones and dolomite in huge masses, with great cliffs. At times they assume the most picturesque and varied forms and the richest colour, as in the dolomite region E. of Botzen on the borders of Italy and Tirol.

### Rivers and Great Lakes

A marked feature of the Alpine region is its greater steepness on the S. side; the plain of Lombardy is only a few feet above the level of the sea, whereas Lake Constance, which is much farther from the great central ranges, is 1,300 ft. above the sea level. The rivers on the S. side descend with fairly straight course to the Po, while on the N. side the Rhine flows in its rapid upper course N.E. by E. and then N., and, after passing through the great lake, nearly due W., until it turns again N. at Basel.

Crossing the main Pennine chain by the Weissthor pass near Monte Rosa from the N., you ascend by a long glacier to extensive and rather gentle snow slopes, but on reaching the summit of the pass suddenly look down precipitous rocks thousands of feet into the deep Val d'Anzasca. On the N. side of the pass is the expanse of glacier, with its steady imperceptible movement, on the S. the mountain ridges keep up a recurrent bombardment of falling stones down their precipices.

So on the S. side, the great lakes which fill the deepest depressions in the folds of the mountains—Maggiore, Como and Garda—lie N. and S. at right angles to the main chain; whereas the general direction of those on the N. side,

Lucerne, Zürich, and Constance, and also Lake Geneva, which lies N. of the highest mountains—though the Rhône, after flowing almost N. from Martigny to the lake, ultimately bends to the S.—is E. and W., parallel to the main chain. No water from the Alps goes to the Baltic; it is to the Danube that by far the greater part of the E. Alps is drained.

Historically the Alps have formed a barrier between northern Europe and Italy, impassable except by certain well-known routes, and then as a rule only in summer. The lowest important pass across the main chain is the Brenner (4,500 ft.), dividing the mountains of E. and W. Tirol. It was known to the Romans and used by the barbarian invaders. By this pass the first railway route from Germany to Italy crossed the Alps. It was opened in 1867. The main ranges have since been pierced by railways near Mont Cenis in the W., opened in 1871; through the St. Gotthard in the centre, opened in 1882; and between the Rhône valley and Lake Maggiore by the Simplon, opened in 1906. From the time of Hannibal the crossing of the Alps has been a difficult problem for military leaders aiming at Italy, and the story of the various Alpine passes is full of interest. The Alpine region, too, has been the home of a hardy people, free and independent, protected from many of the devastating wars which have swept over the plains. Despotism does not flourish in mountain air.

#### Some Notable Ascents

Alpine climbing, as a sport exercising body and mind, dates from the middle of the 19th century. Before that time some of the higher Alps had been ascended, notably Mont Blanc, the summit of which was first reached, at the instance of De Saussure, by two guides from Chamonix in 1786, and by De Saussure himself the following year. Other peaks were conquered, especially in the Oberland, early in the 19th century. In 1854 came the ascent of the Wetterhorn by Alfred Wills (afterwards Mr. Justice Wills), brilliantly recorded in his *Wanderings Among the High Alps*; in 1855 of Monte Rosa by G. and C. Smyth and others of an English party; in 1861 of the Weisshorn by Tyndall, and in 1865 of the Matterhorn by Edward Whymper with a party of seven, four of whom lost their lives in a terrible accident when descending. Since then almost every Alpine peak has been repeatedly ascended.

The English Alpine Club was formed in 1857, and in its journal has published regularly accounts of new routes. No corner of the mountain region of central Europe now remains unexplored. "Climbing is no longer a laborious curiosity." Each of the greater peaks is the subject of a regular tariff of fees for guides, who convey inexperienced tourists to places once deemed inaccessible.

#### Weather and Climbing

But still for the true climber there are difficulties to be surmounted, taxing all the energies of body and mind to the utmost. Weather conditions may make an "easy mountain" difficult, dangerous, or impossible. Mountain craft is learned only with close attention and long practice.

Alpine literature, dealing not only with climbing and discovery but with the geology and petrology of the mountains, their flora and fauna, and the ethnology and history of the inhabitants, now forms a great library.

*Bibliography.* *Wanderings Among the High Alps*, A. Wills, 1858; *Alpine Guides*, John Ball, 1863, *et seq.*; *Alpine Journal*, 1864, *et seq.*; *The Alpine Regions of Switzerland and the Neighbouring Countries*, T. G. Bonney, 1868; *Alpine Plants*, ed. D. Wooster, 1872-4; *The Playground of Europe*, Sir Leslie Stephen, 1894; *Scrambles Amongst the Alps in the Years 1860-69*, E. Whymper, repr. 1908; *Plant Life in Alpine Switzerland*, E. A. N. Arber, 1910; *The Alps*, A. H. M. Lunn, 1914; *The Alps from End to End*, Sir Martin Conway, repr. 1933; *The Structure of the Alps*, L. Collet, 1936; *Alpine Climbing on Foot and with Ski*, E. A. M. Wedderburn, 1937; *The Alps*, R. L. G. Irving, 1939; *Alpine Ways*, F. S. Smythe, 1942.

**Alpujarras**, LAS (Arabic *al-bushirat*, land of rich pasture). Mountainous district in Granada and Almeria provs., Spain, S. of the Sierra Nevada and N. of the Sierra Contraviesca. Beautiful and fertile, it produces grapes, oranges, and figs in abundance; metals, principally lead, are mined. The district gave its name to the War of the Alpujarras, 1500-70; the last of this series of revolts by the Moorish population against their Spanish conquerors was crushed by Don John of Austria.

**Alruna**. In Norse mythology, the runes which were whispered to Odin by the head of his uncle Mimir, after it had been cut off by the Vanir. These runes, or wise sayings, were distributed among the Aesir, the Elves, the Vanir, and mortal men.

**Als**. Island off S. Jutland, Denmark, in the Little Belt, close to the German border. It is separated from the Danish mainland by Als Sound, which narrows down from 2½ m. to 300 yds., at which point it is crossed by a rly. The island is 20 m. long, 11 m. broad; area 124 sq. m. Deeply indented on the W., it is picturesque and fertile and has fine orchards. Sønderborg, its chief town (pop. in 1950, 16,204), has a good harbour and textile, margarine, and iron works. In its old castle (built 1169) Christian II of Denmark and Norway was imprisoned 1532-59. From Sønderborg rlys. run E. to Mommark, on the E. coast of Als, and W. to the mainland of Jutland.

Als shared the history of Slesvig-Holstein, of which it was an important part. Its capture by the Prussians in 1864 brought the Danish War to an end. In 1920 it was returned to Denmark as a result of the Slesvig plebiscite.

**Alsace** (Ger. *Elsass*). Name of a former province of France, still used for the district, most of which is included in the departments of Bas-Rhin and Haut-Rhin. Alsace lies between the river Rhine and the Vosges mts., with Lorraine to the N. and Switzerland to the S. Strasbourg is the historic capital, other important towns being Colmar and Mulhouse. Its chief rivers are the Rhine and the Ill; it is also watered by the Marne-Rhine, the Rhône-Rhine, and the Saar canals. Geographically it is divided into two parts, a mountainous region in the W. and a plain in the E. Well timbered and fertile, it has a flourishing agriculture. Hops, the vine, beet, tobacco, and fruit, especially plums and cherries (out of which kirsch is made) are grown. Alsatian wine has long had a high reputation. There are limestone, sandstone, and gypsum quarries, petroleum wells, and potash deposits; tanneries, paper factories, stoneware and pottery works. Textile and chemical industries and mechanical engineering are well developed. The villages are clean and full of flowers, and many lovely old houses remain. And the storks (217 nests in Alsace in 1953) are cherished by the Alsatian people who look eagerly forward to their return each spring.

Having often been obliged to fight for their independence, Alsacians are liable to be difficult to deal with. Inclined to take everything in earnest, they yet have a great sense of humour. The name Alsace probably means the country of



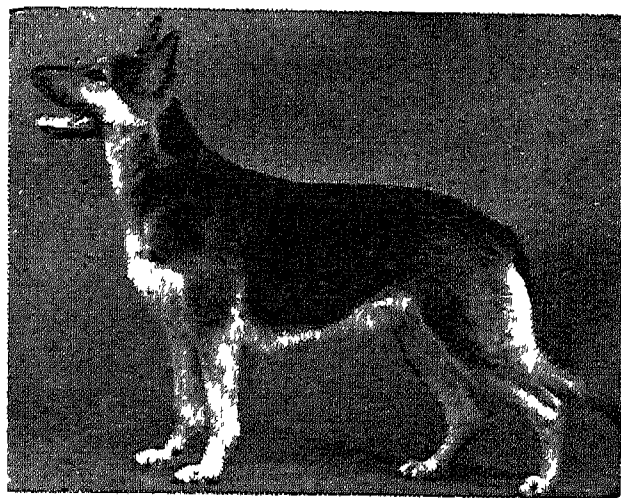
German policy grew somewhat less repressive; from 1905 French was compulsory in schools.

By 1910, 1,643,260 of the inhabitants (nearly 90 p.c.) understood German (they spoke the traditional Germanic dialect of the district, which includes some French words) and 204,262 spoke French. This raised a problem for the French when the territory was restored to France by the treaty of Versailles, 1919. France did not make the mistake of trying to compel the inhabitants of the recovered territories to speak only French. After the defeat of France in June, 1940, the Germans again annexed the district. A Nazi gauleiter was appointed for Alsace, another for Lorraine. The use of the French language was forbidden. Alsace and Lorraine were liberated during Nov., 1944-Feb., 1945, by the French 1st army, commanded by General de Lattre de Tassigny, and the French 2nd armoured division (attached to the U.S. 7th army), which took Strasbourg on Nov. 23, 1944, and held it despite the Ardennes counter-offensive. See also Alsace; Lorraine; Westmark.

**Alsatia.** Nickname applied in the 16th and 17th centuries to the Waitefriars district of London, between Fleet Street and the Thames. About 1241 a house of the Carmelites or White Friars was founded immediately E. of the Temple. At the dissolution of the monasteries, dwelling-houses were built on the site, but the right of sanctuary was allowed to persist until 1697, and the quarter became infamous as a refuge for debtors, thieves, and other disorderly characters. Alsace, or Alsatia, being debatable land between France and the Empire, the name was given to this area between the Temple and the former royal residence of Bridewell. Much of the site was later occupied by newspaper and other publishing and printing works.

**Alsatian OR GERMAN SHEPHERD DOG.** Originating in Germany, from a combination of various types of sheep dog, the Alsatian

rapidly became popular in the U.K. after the First Great War. In appearance it should be powerful but not massive, and never of greyhound type. Height at the shoulder should be 22 to 26 inches. The coat is smooth and hard with a woolly undercoat. Colours may be varying shades of grey, fawn, or sable, black and tan, or black, but not white. The ears are pricked, and the expression very alert; the gait is smooth, easy, and untiring.



**Alsatian.** Powerful, intelligent dog, 22 to 26 ins. high at the shoulder

The Alsatian was used most successfully during the Second Great War to locate and rescue buried victims of air raids, and is extensively used as a police dog, a guard dog in the army and the R.A.F., and a guide dog for the blind. Like all dogs, more especially those with keen guarding instincts, it needs proper handling, and training in habits of obedience. Its handsome appearance and its remarkable intelligence, coupled

with its fidelity to its owner, make this dog popular also as a pet.

**Alsen.** German form of Als (*q.v.*).

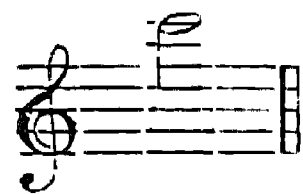
**Alster.** River of Schleswig-Holstein, N. Germany. It is a tributary of the Elbe, which it joins at Hamburg. It is 32 m. long, and navigable. Outside Hamburg it forms a large lake, the Outer Alster (about 430 acres), and within the town a smaller lake, the Inner Alster.

**Alston.** Market town of Cumberland, England, at extreme E. of the co. Nearly 1,000 ft. above sea level in the south Tyne valley of the Pennines, it is claimed to be the highest market town in England. Lead-

mining has flourished, but deposits are nearing exhaustion. Manufactures include flannel and thread. Market day, Sat. Pop. (1951) 2,327.

**Alstromeria.** Genus of perennial plants of the family Amaryllidaceae, native to Peru, Chile, and Brazil. Species grown in flower borders in Great Britain include *A. aurantiaca*, height up to 3 ft., with orange flowers, and sometimes called Peruvian lily. There are handsome hybrids. All are excellent as cut-flowers. Propagation is by seed, and by division of root-clusters.

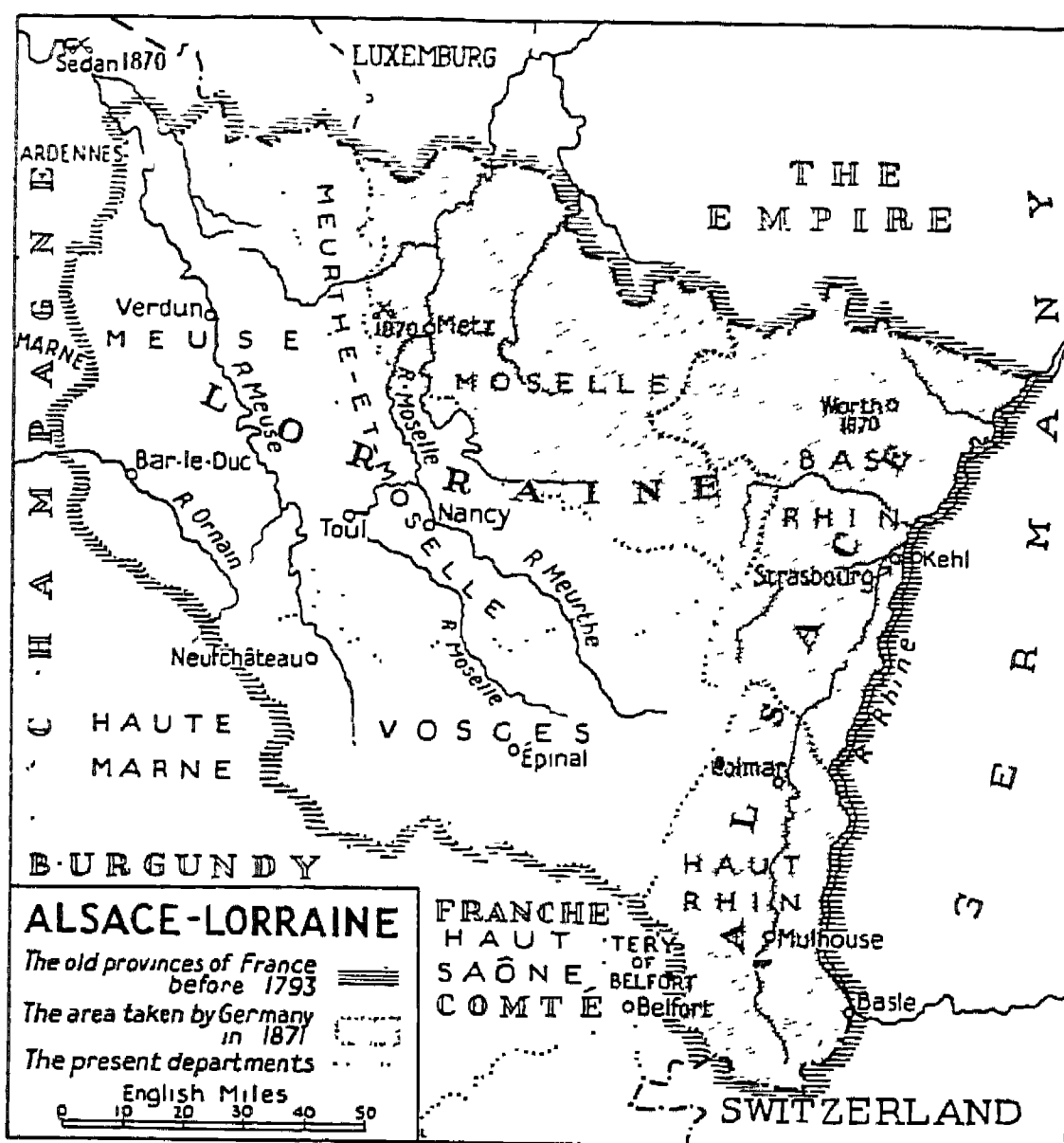
**Alt** (Ital. *alto*, high). In music, the first octave of musical notes above the treble staff, C in alt:



**Alt.** German form of the name Aluta (*q.v.*), or Olt, a tributary of the Danube.

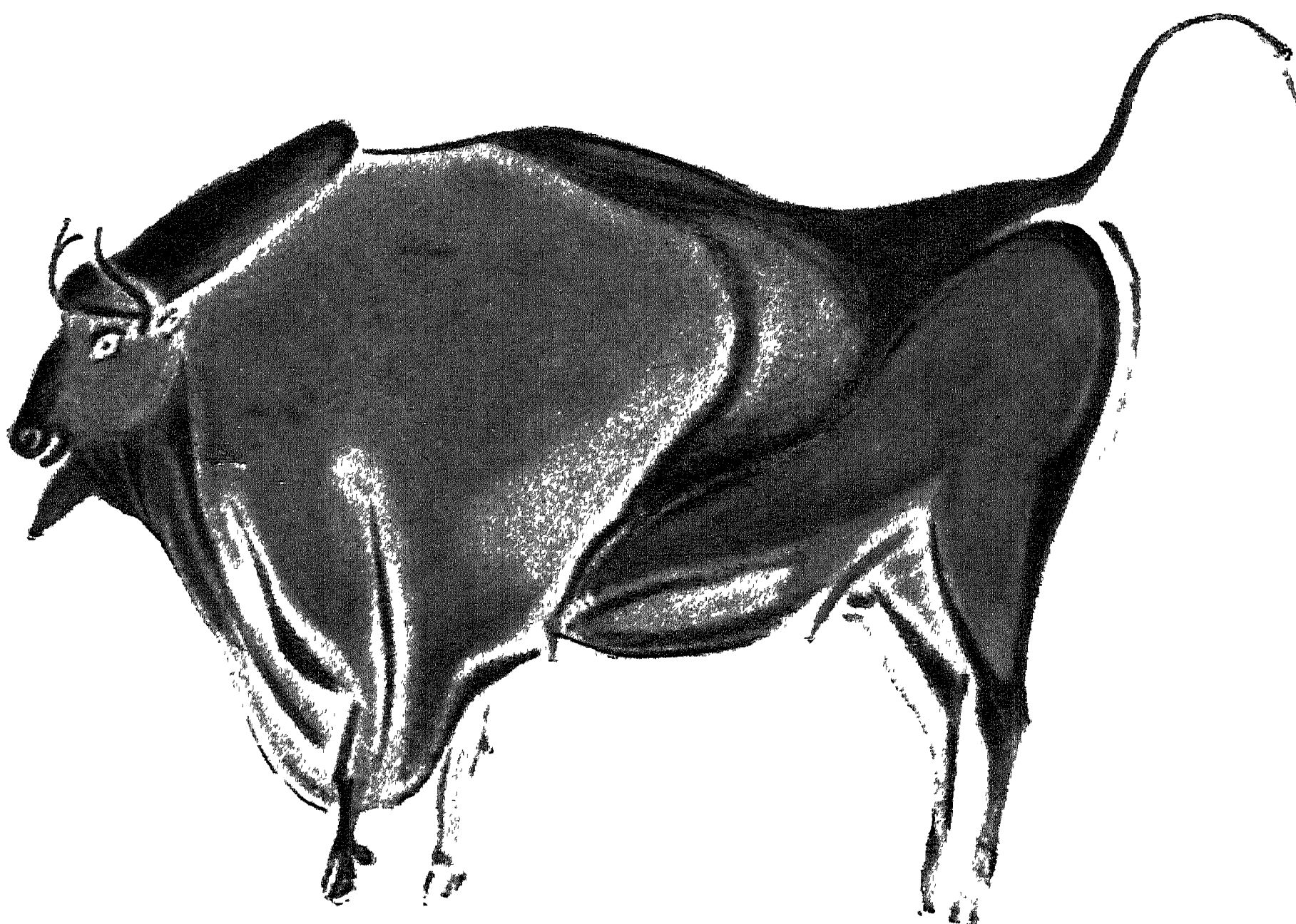
**Alta Fiord.** See Alten Fiord.

**Altai.** Territory of the R.S.F.S.R., part of the former W. Siberian region. It is in the upper basin of the Ob, and extends S. to the Altai mts. The foothills have a dairy industry; mineral resources include gold and mercury. Farther north the steppe is richly agricultural, the crops including wheat, sugar-beet, and flax. The territory is traversed by the Turk-Sib rly., a branch of which connects the capital, Barnaul, with Bijsk, the second city. Area 101,000 sq. m.; pop. (est.) 2,400,000. In the south-east,





Lowling bison, in polychrome



A bison, in polychrome : the original painting  
on the cave ceiling is 4 feet 11 inches wide

**ALTAMIRA: STONE-AGE PAINTINGS FROM DRAWINGS MADE BY THE ABBÉ BREUIL**

To face page 322



body of the church at the Communion time; after 1660 it was replaced altarwise at the east end. The oldest known altar is in S. John Lateran, Rome; once in the catacombs, it is in form an ark-like chest, on the lid of which the Eucharist was offered.

**Altazimuth.** Instrument used in astronomy to determine the exact apparent position of a star in the heavens at any instant. The star is observed through a telescope, which is in contact with a graduated vertical circle, the telescope being free to turn about a horizontal axis through the centre of the circle and perpendicular to its plane. The whole apparatus is so mounted that it can be rotated about a vertical axis, and the angle of rotation is shown by means of a graduated horizontal circle. Thus, when the telescope is pointed at a star, the reading on the vertical circle gives the altitude of the star, that on the horizontal scale the azimuth or angle with the meridian. Altazimuths are used mostly on objects which cross the meridian in daylight. The surveyor's Theodolite (*q.v.*) is also an altazimuth.

**Altcar.** Village of Lancashire, England. The headquarters of English coursing, it lies 2 m. S.E. of Formby; the Waterloo Cup event takes place here annually in February.

**Altdamm** (Pol. Dabie). Town of Polish-occupied Pomerania. It makes products from potatoes, *e.g.* starch and cellulose. It is at the head of the Dammsche See (Zalew Szczecinski), 5 m. E. of Stettin (Szczecin), and is served by rly.

**Altdorf** OR ALTORF. Capital of Uri canton, Switzerland. A station on the St. Gotthard rly., it is 2 m. S. of Flüelen, on Lake Lucerne, and is the legendary scene of William Tell's shooting the apple on his son's head, a tradition commemorated by a bronze statue erected in 1895. Pop. (est.) 4,000. Bürglen, traditional birthplace of Tell, is 2 m. to the East.

**Altdorfer**, ALBRECHT (c. 1480–1538). German artist, outstanding as an engraver on both copper and wood. Born at Ratisbon (Regensburg), Bavaria, he spent his early years at Amberg, and returned in 1505 to his birthplace. He designed the city ramparts against a Turkish invasion. Of his paintings, the Battle of Arbela and St. George and the Dragon (Munich) and a Nativity (Bremen) are notable. His pictures are notable for romantic imagination, and his colouring is rich and

strong. As an engraver he is considered to rank close behind Dürer. Consult Altdorfer, T. Sturge Moore 1900.

**Alten**, COUNT KARL AUGUST VON (1764–1840). A Hanoverian soldier, otherwise Sir Charles Alten, who led a division at Waterloo. After serving in the Hanoverian army until it was disbanded in 1803, he joined the German legion in the British army, and fought in several campaigns during 1805–09. He commanded the famous light infantry division in the later battles of the Peninsular War, and was wounded at Waterloo. In 1818 Alten returned to Hanover, where he was minister for war and foreign affairs until his death, April 20, 1840.

**Altenburg.** Capital of the E. German sub-district of Altenburg (formerly the duchy of Saxe-Altenburg). It lies 26 m. by rly. S. of Leipzig and has a 14th-century castle on a rock and a 16th-century town hall. It manufactures bricks, cement, cigars, woollens, gloves, hats, playing cards, optical instruments, and sewing-machines. Pop. (est.) 42,500.

**Alten Fiord.** Inlet in the extreme N. of Norway, in Finnmark co., 70° N. and 23° E. Running S. from Sørø sound, it breaks into two arms, the town of Alten (pop., 1950, 5,464) lying on a peninsula between them. Just N.E. of Alten is the little seaport of Altengaard or Altagard. During the Second Great War, the German battleships Tirpitz and Scharnhorst (*qq.v.*) sheltered in Alten Fiord.

**Altenstein.** Castle in Thuringia, E. Germany. It is 13 m. S.E. of Eisenach, and was a summer residence of the dukes of Saxe-Meiningen. S. Boniface preached here during 724–727; and here Luther was seized by his friends in 1522 after he had been threatened with outlawry.

**Alternating Current.** Electric current which flows or oscillates for a certain time in one direction followed by a flow in the opposite direction. It is produced by an alternator, a thermionic valve generator, or by other means. In one period, or cycle, the current grows from zero to its maximum positive value, falls to zero, reverses its direction, grows to maximum negative value, and falls to zero. The simplest alternating current passes through this cycle of changes in a definite time, *e.g.* 50 cycles per second in the standard supply system of Great Britain, or 877,000 cycles (877 kilo-

cycles) per second in the 342.1 metre wavelength of the high-frequency radio transmission of the B.B.C. The number of cycles per second is the frequency.

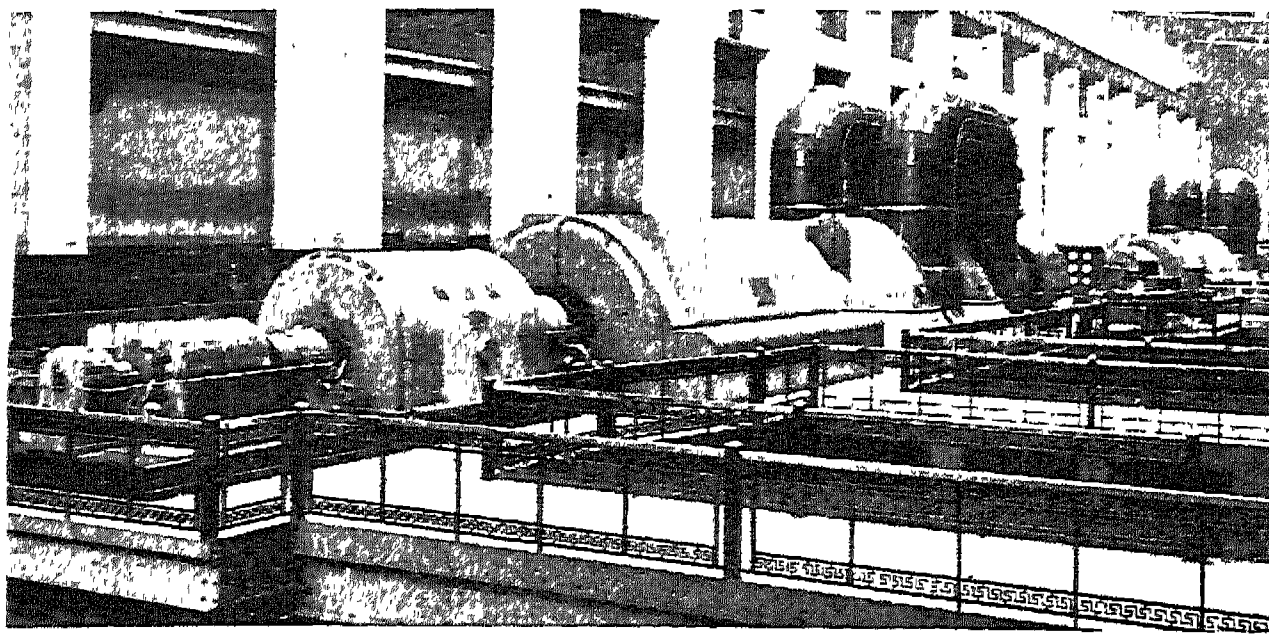
In direct or continuous current circuits the current, or electron flow, is steady and does not vary in magnitude or direction.

An alternator generates single or polyphase alternating currents. Three-phase A.C. is standard in British power stations. This means that three currents are generated, each having separate, overlapping cycles, and each rising and falling to maximum and minimum voltages 50 times a second. The peak, or maximum voltage, of the first phase is followed by the peak of the second, and this in turn by the peak of the third.

Alternating current (A.C.) is far more economical than direct current for transmitting power over distances for which high voltages are essential, and alternators are more convenient than dynamos for generating high voltages, capacities as high as 33,000 volts (33 kV.) being standard. A.C. is also readily transformed, voltages being raised or lowered by machines (transformers) without moving parts.

**Alternation of Generation.** Process of reproduction. The most familiar method by which living organisms reproduce their kind is for two parents to give rise, by a sexual process, to offspring which grow, mature, and in their turn reproduce as did their parents. But this method is not universal. Among both animals and plants other patterns of reproduction appear, some of which are grouped together under the term metagenesis or the alternation of generations.

The essential characteristic of all such alternations is that successive generations reproduce in different ways, for example sexually and asexually. A common concomitant is that the two generations should differ markedly in form as well as in method of reproduction. Examples of metagenesis in animals are found among the Protozoa, the Coelenterata, and in many parasitic worms. Thus in some coelenterates belonging to the order Hydrozoa the sexually reproducing generation takes the form of small free-swimming animals called medusae which bear a close resemblance to the bell-shaped jelly fish common in most seas. These produce eggs and spermatozoa which



Alternator. Two of the main turbo-alternators installed in 1939-40 at Battersea Power Station. They generate 69,000 kW.

construction problems in alternators the magnetic field (the rotor) is rotated, not the conductors. Current (rising and falling in voltage value 50 times per second) is produced in the conductors of the armature (stator). Direct current from the exciter is led to the rotor (to produce the magnetic field) by brushes which press on slip rings on the rotor shaft. The current generated in the stator is led away direct to switchboards by cables to the mains and external transmission lines. No commutator is required. More than one current can be generated in a cycle according to the number of separate conductors to each pair of magnetic poles. Normal practice employs three conductor systems giving three-phase current. In the overhead transmission systems used all over Britain four lines, or conductors, are seen: one (uninsulated) is the earth line, the other three (insulated) carry the three-phase supply. Polyphase alternators, *i.e.* 4, 6 or more phases, are also employed for certain purposes.

Alternators may be driven by steam engines (slow speeds), water turbines (varying speeds), or steam turbines (high speeds). The last are usually called turbo-alternators and are used in all British power stations since they give high output with high efficiency. In the great Battersea power station of the "grid" system there were in 1946 three turbo-alternators, two each generating 69,000 kilowatts at 3,000 r.p.m., and a third giving 105,000 kilowatts at 1,500 r.p.m. Battersea was designed for a total output of 550,000 kilowatts (or about 50,000 amperes at 11,000 volts). Large turbo-alternators are also installed at Barking, Fulham, Hams Hall near Birmingham, and other stations of the "grid" system. See Alternating Current.

**Althing.** Name of the parliament of Iceland. The Scandinavian word *thing* means an assembly, and is found in storthing and husting. The Althing, or assembly of the elders, dates from the 10th century, but its present form only from 1874, when the king of Denmark gave a constitution to Iceland. It consists of 52 members elected by universal suffrage. The upper house consists of one third of the members elected by the whole Althing in session; the lower house of the remainder. After Germany invaded Denmark, April 9, 1940, the Althing assumed the royal power next day, and on May 16, 1941, terminated the union with Denmark.

**Althorn.** A brass musical instrument of tenor pitch, the E flat or F saxhorn. The name is also sometimes applied to the baritone saxhorn in B flat.

**Althorp.** Seat of Earl Spencer. It is 5 m. N.W. of Northampton, and came into the possession of the Spencers in the time of Henry VII. The original mansion has been much altered, in part by the 1st countess of Sunderland, Waller's Sacharissa. The house contains works by Gainsborough, Reynolds, Van Dyck, Lely, Holbein, Murillo, Rembrandt, Hals, and others.

**Althorp Library.** Collection of more than 40,000 volumes which formed the nucleus of the John Rylands Library, Manchester. It belonged to the 5th Earl Spencer and includes an almost unrivalled collection of examples of early printing: *e.g.* the first printed Bibles; the "42 line" and the "36 line" Latin Bibles; and more than 800 editions printed at the Aldine Press, Venice.

**Altimeter.** Instrument constructed on the principle of the aneroid barometer to register the height attained by an aircraft. It is actuated by a collapsible metal capsule exhausted of air, the shape

of the capsule being altered by changes in the pressure of the atmosphere surrounding it. The face of the capsule is linked, through gearing, to a direct-reading indicating needle. Three capsules may be interconnected to make the instrument more sensitive. Various devices are employed to correct errors due to varying atmospheric pressure at the same height and other causes, and the error of the modern altimeter does not exceed 0.5 per cent at 15,000 feet. See Aneroid.

**Altissimo** (Ital., very high). In music, the octave above alt. Thus C in altissimo is:—



**Altitude.** In astronomy, the angular height in degrees of a star above the astronomical horizon.

**Altkirch.** Town of France, in Haut-Rhin dept. It is 17 m. W.N.W. of Basel, has cotton factories and quarries, and trades in grain. Pop. (1954) 4,544.

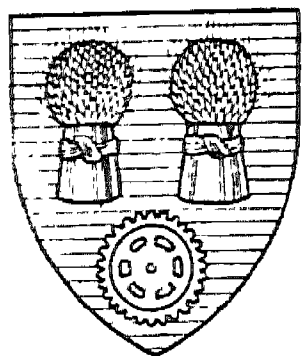
**Altmark.** German ship of the tanker type. In 1939-40 the Altmark achieved notoriety as a prison ship, satellite of the Admiral Graf Spee (*q.v.*). It was her duty to carry supplies to the Nazi raider and to take aboard any British survivors of the sinkings. On Dec. 6, 1939, in the S. Atlantic, she relieved the Graf Spee of her last haul of prisoners, and with a total of 299 captives under her hatches headed northwards. Having reached Icelandic waters, she turned south and was sighted off Norway by British aeroplanes on Feb. 16, 1940.

Shortly afterwards the Altmark was intercepted by H.M.S. Intrepid, one of a destroyer flotilla commanded by Capt. Vian of the Cossack, and the British Admiralty ordered that the British ships should enter neutral waters, search the Altmark, and rescue any prisoners found. By this time the German ship, escorted by two Norwegian gunboats, had slipped into Joessing Fjord, a small inlet with a dead end, S. of Egersund. Capt. Vian, in the Cossack, reached the mouth of the fjord, where the destroyer Ivanhoe was standing by, and was here assured by the captain of one of the gunboats that the Altmark was unarmed, had been searched at Bergen, had no prisoners, and had permission to use Norwegian territorial waters.

The British destroyers withdrew, but acting under further Admiralty orders, Cossack re-entered the fjord after dark. By skilful



**Altrincham.** Mun. bor. of Cheshire, England, 8 m. S.W. of Manchester, and served by railways, including the former Manchester S. Junct. and Altrincham rlys. The town is mainly residential and industrial, as well as being an important market-garden centre. A charter naming Altrincham as a free borough was



Altrincham arms

granted in 1290, and a record of mayors since 1452 has been kept. It was incorporated as a mun. bor. in 1937. There are generous open spaces and excellent parks and a municipal golf course. Altrincham and Sale formed a bor. constituency under the 1948 redistribution. Market days, Tues. and Sat. Pop. (1951) 39,787.

**Altruism** (Lat. *alter*, another). All action, to quote Herbert Spencer, which in the normal course of things benefits others instead of benefiting self: the opposite of egoism. To live for oneself is the principle of egoism, to live for others the principle of altruism. The term originated with the French Positivist Auguste Comte, who considered altruism to be the indispensable condition of all culture and morality.

**Altwegg, JEANETTE ELEANOR** (b. 1930). British figure-skating champion. Born Sept. 8, 1930, in India, daughter of a Swiss-born naturalised British father and a Scottish mother, she began skating in Liverpool when 6, and from the age of 10 devoted herself entirely to the art. She was ladies' figure-skating champion of Great Britain 1947, 1948, and 1949, of Europe 1951 and 1952, and of the world 1951. After winning the Olympic Games gold medal in 1952, she retired from competition skating to work in the international Pestalozzi children's village in Switzerland, and in 1954 married Marc Wirz, a Swiss engineer.

**Altyn-tagh.** Range of mts. in S.W. China. It forms in part the boundary between Tibet and Sinkiang. The highest ascertained alt. is 14,000 ft. In this range the wild camel is found.



Aludel. Series of three of these earthenware vessels used by old-time alchemists

**Aludel** (Arab., utensil). Vessel of earthenware or glass formerly used for condensation. Externally

its shape is similar to that of an Indian club. An ancient piece of chemical apparatus, it will be found illustrated in most pictures of alchemists' laboratories. Its purpose is to condense, on the inside, metallic fumes, produced in the process of distilling the more volatile metals out of their ores. It is used in series as shown in the illustration, 500 to 600 vessels being connected with one furnace.

**Alum** (Lat. *alumen*). White transparent mineral salt consisting of the double sulphate of aluminium and potassium with water of crystallisation ( $\text{Al}_2(\text{SO}_4)_3 + \text{K}_2\text{SO}_4 + 24 \text{H}_2\text{O}$ ). This is the typical alum, but the term is extended to a series of double sulphates of the same general formula. There are, for instance, alums similar to potash alum, except that the potassium is replaced by ammonia, soda, or silver, these being known as ammonia alum, etc. On the other hand, a series exists of double sulphates, also known as alums, which contain no aluminium. Examples of these are iron alum, manganese alum, and chrome alum.

Pliny and Dioscorides describe the varieties and uses of alum. In the 15th century Pope Pius II carried on a famous alum factory at Tolfa, near Civita-Vecchia, Italy, alunite or rock alum being the raw material. Roman alum, or roche alum, is still asked for when a pure alum is desired. The manufacture of alum was introduced into England in the 18th century by Challoner, who discovered a suitable aluminous deposit at Guisborough, Yorkshire.

The raw materials from which alum is made are alunite, otherwise known as alum stone, found chiefly at Tolfa and Solfatara, in Italy, and Puy de Garcey, Auvergne, France; alum shale and alum schist, found at Whitby, Yorkshire, Campsie, Scotland, and other parts of the world; bauxite, and cryolite. The original methods of making alum consisted of weathering the alum stone, burning it in heaps, and then lixiviating the product with water from which the alum crystallised. The modern process is to calcine the alunite at a high temperature and treat the product with sulphuric acid, when both aluminium sulphate and alum result, these being separated from each other by crystallisation; or the whole is converted into alum by adding sufficient potassium sulphate. When potash alum is strongly heated the water of crystallisation

is thrown off, and the product swells up and produces burnt alum. Potash alum only was at first produced, but in 1845 Spence introduced the manufacture of ammonia alum from the refuse shale underlying the coal seams of South Lancashire, Scotland, and elsewhere. One ton of ammonia alum is produced from 15 cwt. of shale. Alum is also made from aluminium sulphate derived from bauxite or china clay.

Ordinary alum is much used for its astringent or drying properties. The largest industrial use of alum is in dyeing, as a mordant or fixer of the colours to the fabric. It must be free from iron. Combined with acetic acid, it forms the red liquor of the dyer. A great variety of solid colours known as lake pigments is made, in which alum is required as the base. It is also used in making shower-proof garments; as a fireproof filling for safes; for fireproofing fabrics and wood; for hardening plaster of Paris; in tawing leather; for sewage purification, and for softening water. In medical practice, alum is frequently used as a mild caustic and astringent.

**Alum - bagh.** Palace within walled grounds, 4 m. to the south of Lucknow, India. It was converted into a fort by Sepoys in the Mutiny. Their position, which rested on Alum-bagh, was stormed and captured, Sept. 23, 1857. In Nov., 1857, Havelock was buried within the fort, which was held by Outram against the Sepoys until its relief by Sir Colin Campbell, March, 1858.

**Alum Bay.** Beach at the extreme W. of the Isle of Wight, England, bounded by Hatherwood Point and the Needles (*q.v.*). The cliffs are famous for the multi-coloured strips of sandstone which contrast with the basic white of the chalk. Bagshot beds (*q.v.*) are exposed here.

**Alumina.** An earthy mineral, chemically an oxide of aluminium (sesquioxide), its formula being  $\text{Al}_2\text{O}_3$ . It is perhaps the most abundant and widely distributed of the earths. In combination with silica it forms clay; the compound, though commonly reddish owing to the presence of iron, is white when pure, as in china clay used for the production of porcelain. It constitutes a large proportion of slate and of all slaty rocks and shales.

Alumina is derived from the granite rocks, where it is present in combination with silica and potash in the form of feldspar. It is by

material find their way into the metal: the leading producers therefore make their own electrodes from special grades of coke.

Commercially pure aluminium, produced by the electrolytic process, has a purity of 99.5 p.c. or more. Super-purity aluminium, produced on an industrial scale by double electrolysis, has a purity approaching 99.99 p.c.

**USES.** Like most non-ferrous metals, aluminium has relatively poor mechanical properties, but these can be improved by cold rolling, drawing, and pressing. In general, the pure metal is used where its chemical and physical properties are of value, chiefly its resistance to corrosion, high thermal and electrical conductivity, light and heat reflectivity, and its affinity for oxygen. Its mechanical properties are very markedly improved when it is alloyed with other metals; the bulk of the aluminium in use is alloyed and the term aluminium covers the pure metal and its alloys.

#### Light Structural Alloys

Most of the light structural alloys owe their good mechanical properties to some form of heat treatment, *e.g.* age hardening. Alloys have been developed with characteristics to suit various applications. The more important of these are known by their trade names, and contain varying proportions of alloying elements, chiefly magnesium, manganese, copper, zinc, nickel, iron, and silicon. Alloys which are less resistant to corrosion than pure aluminium can be protected by sandwiching them between two thin layers of the pure metal. Most of the alloys are covered by British Standards Institution or Department of Technical Development (ministry of Supply) Specifications in Great Britain.

In the transport industry, cast aluminium alloys are used for engine crank-cases, cylinders, pistons, gearboxes, and numerous fittings, both on road vehicles and on aircraft. The high-strength structural alloys are extensively used in wrought form for aircraft and for road and rail vehicle bodies. Alloys containing silicon, magnesium, manganese, and sometimes antimony resist salt-water corrosion, and are used for ships' superstructures, and for the hulls and fittings of small craft.

Aluminium alloy sections have been used as the structural members of bridges, buildings, cranes, and mine equipment; aluminium sheet is used for factory walls and

roofs; and for prefabricated houses. Many traditional-type buildings incorporate aluminium window frames, handrails, and fittings, often anodised and coloured.

#### Food-Processing Equipment

The good heat conductivity and hygienic qualities of aluminium make it useful for cooking utensils; it is used, too, for kitchen fittings *e.g.* sinks. Most food-processing trades use aluminium equipment; and aluminium vessels are used in both production and transport in the dairy and brewing industries. For many of these purposes pure aluminium is used, because it is more resistant than are most of its alloys to chemical attack by, *e.g.*, fruit juices, milk, alcohols, beers, explosives such as nitro-glycerine and lead azide, and sugar solutions. Acetic, butyric, oxalic, and succinic acids, and alkalis and salt solutions, attack the metal, but the reaction is often sufficiently slow to permit the use of aluminium with these materials. But it is essential that aluminium cooking and food-processing utensils be kept scrupulously clean to prevent their surfaces being pitted by acidic action.

In the electrical field aluminium competes with copper for almost every purpose. The biggest uses are for busbars and overhead transmission lines, because although the conductivity of aluminium is only 60 p.c. that of copper, the very low density of aluminium means that weight for weight it can carry more current. The metal is also used for sheathing electric cables. Anodically insulated aluminium wire is used for electro-magnet windings. Capacitors and earthing shields in radio equipment are often of aluminium.

Aluminium can be deposited as a reflecting layer by evaporation in a vacuum, and the surfaces in telescopic mirrors prepared in this way last several years, compared with the few months' duration of a silver coating.

Aluminium can be melted in air without serious oxidation, but at high temperatures it burns vigorously, with a large output of heat. By oxidising powdered aluminium with magnetic iron oxide, temperatures as high as 3,000° C. can be obtained. The mixture called Thermit (*q.v.*) is an ingredient of incendiary weapons, and similar mixtures are used for welding steel rails and in the aluminothermic reduction process for the production of carbon-free ferro-alloys. Aluminium is also used as a deoxidising agent for steel and some

non-ferrous metals, and as a grain-refining agent for steel.

Corundum, a naturally occurring aluminium oxide,  $\text{Al}_2\text{O}_3$ , is the hardest substance found in nature, except diamond, and is used extensively as an abrasive under the name emery. Rubies and sapphires are varieties of gem quality. Artificial rubies and sapphires can be made by cooling molten aluminium oxide from 2,100° C. under controlled conditions, and adding small amounts of other oxides such as those of cobalt or copper to give colour. These artificial gems are used as bearings ("jewels") in watches and other instruments, and as dies for drawing wires to small diameters.

**CHEMISTRY.** Aluminium is a member of group III of the periodic table, with three electrons in its outermost electronic order, which it uses for valency links. The small atomic volume and the triple charge on the ion tend to make the compounds covalent. The pure metal is insoluble in water and is unattacked by nitric acid, but hydrochloric acid dissolves it with the evolution of hydrogen. The metal is also soluble in alkaline solutions, forming aluminates (*e.g.* sodium aluminate,  $\text{NaAlO}_2$ ). It combines with chlorine to form aluminium chloride, which is used commercially in petroleum cracking, and in the laboratory as a catalyst for a number of organic reactions. Aluminium sulphate crystallises from solution as  $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ ; with the alkali metal sulphates, it forms a series of isomorphous compounds called alums (*see* Alum).

#### Aluminium Hydroxide as a Mordant

Aluminium hydroxide,  $\text{Al}(\text{OH})_3$ , prepared by the addition of sodium carbonate or lime to alum or ammonium sulphate, is a good absorbent for certain dyes, and is used as a mordant to attach the dye to the fibre.

Aluminium is usually detected by the precipitation of the amphoteric hydroxide  $\text{Al}(\text{OH})_3$ , with ammonium hydroxide in the presence of ammonium chloride; and quantitatively by converting this hydroxide by heat to the oxide and weighing as  $\text{Al}_2\text{O}_3$ .

Chemical symbol Al, at. wt. 26.97, at. no. 13, valency 3, density 2.714 gm. per c.c., m.p. 658.7° C., b.p. 1,800° C., resistivity 3.21 ohm cm., thermal conductivity about half that of silver.

**Bibliography.** De l'Aluminium, Sainte-Claire Deville, 1859; Aluminium, its History, etc., J. W. Richards, 1896; The Metallurgy of Aluminium, R. J. Anderson,



the great wealth wherein lay their value to his master. Not until the trade of the Netherlands was on the brink of destruction were these taxes abandoned. Alva believed that the Netherlands were helpless and that revolt had been crushed, when suddenly in 1572 it again blazed out. The towns of the northern provinces closed their gates to the Spaniards; in the S. the insurgents captured Mons. Though Mons itself and other towns in succession were compelled to surrender, Alkmaar held out defiantly and the Spaniards were obliged to retreat.

Alva, now conscious that victory won by force would be barren, urged his own recall, and in 1573 his place was taken by the more politic Requesens. Alva went into retirement, from which he emerged in 1580 to compel the submission of Portugal to Philip. He died in Lisbon, Dec. 11, 1582. The 17th duke of Alba (*q.v.*), Spanish ambassador to Great Britain 1939-45, was a direct descendant. *Consult* Revolt of the Netherlands, P. Geyl, 1932.

**Alvarado.** Seaport of Mexico. It stands on the Bay of Campeche, at the mouth of the Alvarado river, 38 m. by rly. S.E. of Vera Cruz. Pop. 8,000.

**Alvarado, PEDRO DE** (c. 1495-1541). Spanish soldier and adventurer. Born at Badajoz, in early life he went to America, and in 1519 was a leader in the expedition under Hernando Cortes for the conquest of Mexico. He remained there as governor after the conquest, becoming governor of Guatemala and later of Honduras.

**Alverstoke.** Seaside resort of Hampshire, England, 1 m. S.W. of Gosport, between the Solent, Spithead, and Haslar Lake. Originally intended as a spa, it has some Georgian architecture and has been a favourite place of residence for naval men. There are fortifications in the district, and eastward is Haslar naval hospital, built 1746-62, with accommodation for nearly 2,000.

**Alverstone, RICHARD EVERARD WEBSTER, VISCOUNT** (1842-1915). British lawyer and politician. A son of Thomas Webster, Q.C., he was born Dec. 22, 1842, and educated at Charterhouse and Trinity College, Cambridge. In 1868 he became a barrister, and in ten years a Q.C. In 1885 he entered the House of Commons as M.P. for Launceston, and was attorney-general in the short-lived Conservative government of that year. He held the same

position from 1886-92 and from 1895-1900, during which years he represented the Isle of Wight. In 1900 he was made Master of the Rolls, but on the death of Lord Russell of Killowen in that year was transferred to the Lord Chief Justiceship, which he retained until 1913. He died Dec. 15, 1915, and, as his only son predeceased him, his barony, dating from 1900, and viscounty, dating from 1913, became extinct.

He conducted the case for The Times before the Parnell Commission, and he represented Britain in the Bering Sea and Venezuela arbitrations. In 1903 he was president of the court appointed to decide the boundaries of Alaska.

**Alves, FRANCISCO DE PAULA RODRIGUES** (1848-1919). President of Brazil. Born in São Paulo, he was a deputy under the Empire. He was president of São Paulo, 1898, of the United States of Brazil from 1902-6 and 1912-16, and was again elected president March 3, 1918, but resigned in the following Nov. through ill-health. The first to be elected president twice, he was largely responsible for stamping out yellow fever and effected important improvements in the city of Rio de Janeiro, where he died, Jan. 15, 1919.

**Alvinczy** OR ALVINZI, JOSEPH, BARON VON BARBAREK (1735-1810). Austrian soldier. His first experiences of warfare were gained during the Seven Years' War. During 1790-93 he served in the Netherlands, and in 1796 was chosen to lead the Austrian army in Italy, where Napoleon defeated him at Arcola, 1796, and at Rivoli, 1797. Made a field marshal, 1808, he died Nov. 25, 1810.

**Alwar.** District of Rajasthan, India, formerly a princely state. Founded 1775 by Pratap Singh from estates in Jaipur territory, it attained its full dimensions of 3,158 sq. m. under his successor, who supported the British in the Mahratta War of 1803. Millet, gram, barley, cotton, and wheat are produced; copper, iron, lead, and marble are worked, and weaving and paper-making are carried on. Rajasthani and Hindi are spoken. Pop. (1951) 861,993.

**Alwar.** Town of Rajasthan state, India. It is situated on the Western railway, 98 m. S.W. of Delhi, and is built on rising

ground, its walls are pierced by five gateways, and it is dominated by a fort placed on a conical rock 900 ft. high. Its buildings include the royal palace, a jewel house and armoury, the mausoleum of Bakh-tawar Singh, the tomb of Fateh Jang, and several large mosques. Pop. (1951) 57,868.

**Alyth.** Town and police burgh of Perthshire, Scotland. It is 17 m. N.W. of Dundee, and has manufactures of woollens, linen, and jute. In the neighbourhood are the remains of a Pictish camp. Pop. (1951) 2,072.

**Amadavat** (*Estrella amandava*). Bird of the family Ploceidae (Weaver-birds) of the order Passeriformes. It is a native of E. Asia, and is sometimes called avadavat. It is a seed-eater, with a conical beak like that of a sparrow, but of blood-red colour. In the mature male, the head and underparts are bright crimson dotted with white. The feathers of the back are dark grey margined with red and tipped with white. The female, which is considerably smaller, is grey, dotted with white; pale sulphur-coloured beneath. It is extensively kept as a cage bird on account of its fine colour and pleasant trilling song.

**Amade, ALBERT GERARD LEO D'** (1856-1941). French soldier. The son of Adolphe d'Amade, military intendant, he was born at Toulouse, Dec. 24, 1856, and was educated at La Flèche and at the lycée of Lorient, Morbihan. He entered the French army as a lieutenant of Algerian infantry at Constantine, Oct. 1, 1876. Military attaché at Peking, 1887-91, and military attaché with British Headquarters in the S. African War, he was promoted colonel in 1903 and was military attaché in London, 1903-6. Advanced to the rank of general in 1907, he commanded the French forces in the operations in Morocco, 1907-9. In 1914 he became a member of the Conseil Supérieur de la Guerre, and on the outbreak of the First Great War was in charge of the mobilisation of the Army of the Alps. Later he commanded a group of territorial divisions operating in the N. of France. In April-May, 1915, he led the French troops in Gallipoli. He died Nov. 11, 1941.

**Amadeus.** Salt lake in the S.W. of Northern Territory, Australia. Except on rare occasions there is nothing but a thin crust, about half an inch of salt, in the lake bed, which is about 200 m. long and of varying width. It was discovered in 1872 by Ernest Giles.



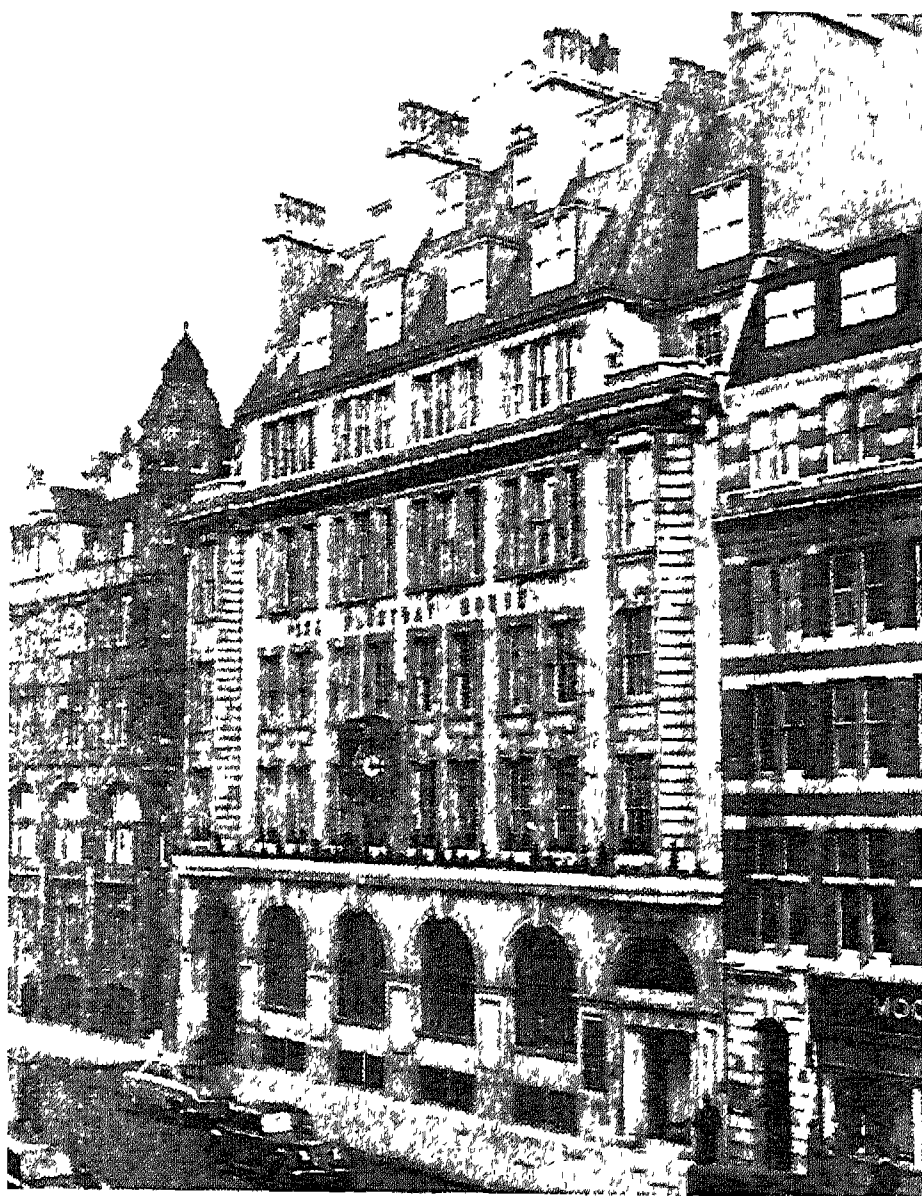
*Alves*  
Elliott & Fry

Northcliffe retired as chairman in 1915, to be succeeded by Sir George Sutton, Bart., until 1927, when the business was acquired by the first Viscount Camrose (then Sir William Berry, Bart.) who was to remain its chairman for the ensuing 27 years until his death in 1954. He was succeeded by his son, the Hon. Michael Berry, M.B.E.

From its inception, the business has expanded. New fields of journalism have been opened by its enterprise, and its many types of entertaining and instructive periodicals have met with the approval of the reading public. In 1955 more than 70 different publications, chiefly weekly journals, were being produced, their aggregate circulation amounting to many millions, and there were few homes in the United Kingdom into which one or more of these periodicals did not enter. To accommodate the ever-growing editorial and commercial staffs, the Fleetway House was erected in 1912 in Farringdon Street, London; it is the company's registered office and principal building.

The company owns two printing works in London, and one at Gravesend, and after the Second Great War acquired further printing and bookbinding interests. It controls the Imperial Paper Mills at Gravesend, with frontages to the river Thames and quay accommodation for vessels up to 8,000 tons. The Imperial Paper Mills has an interest in the Gulf Pulp and Paper Company at Clarke City, Quebec, whence comes a large proportion of the wood pulp it needs for paper manufacture. In 1938 the company acquired a controlling interest in Kelly's Directories, publishers of a wide range of directories in use throughout the world. Kelly's Directories controls Associated Iliffe Press whose many technical journals are leaders in their respective spheres; and Thomas Skinner's well known A.B.C. railway, shipping, and world airways guides. The old-established fashion publishing business of Weldon's Limited was purchased in 1941, and in 1950 the widely-read weekly publication *Everybody's* was acquired.

By 1955 the registered capital of the Amalgamated Press had reached a total of £8,600,000, and the group of which it is the head had become an almost self-contained unit controlling a wide variety of publications and able itself to produce a large proportion of the raw materials it needs.



Amalgamated Press. The Fleetway House, on the east side of Farringdon Street, London, h.q. of this notable publishing firm

**Amalgamation.** Obsolescent process of extracting gold or silver from sands or crushed ore with the aid of mercury, which forms alloys, called amalgams, with the gold or silver. The rest of the ore is washed away and the mercury separated from the gold by distillation in iron retorts.

**Amalia**, DUCHESS OF SAXE-WEIMAR (1739-1807). Anna Amalia, daughter of Duke Charles of Brunswick-Wolfenbüttel, was born Oct. 24, 1739. She became the friend of Goethe, and held a brilliant court at Weimar. In 1756 she married Duke Ernest Augustus of Saxe-Weimar, from whose death in 1758 until 1775 she acted as regent for the young duke, Charles Augustus. Under her rule and that of her son, Weimar was the literary centre of Germany.

**Amalthea.** In Greek mythology, daughter of Melissus, king of Crete. She reared the newly-born Zeus on goat's milk, and as a reward the god gave her the horn of the goat, with the assurance that all her wants should be supplied from it. In another version of the same legend, Amalthea is the Cretan goat itself, which Zeus out of gratitude placed among the stars as a constellation. The horn of Amalthea, *cornu copiae*, the horn of plenty, frequently appears as a symbol of abundance and prosperity on coins of the Roman emperors.

community life based on handicrafts, are attractive to tourists.

**Amand.** Christian missionary and saint, sometimes called the Apostle of Flanders. Consecrated a bishop in 630, he went as missionary to Maastricht. He founded the abbeys of S. Peter and S. Bavon at Ghent. His festival is Jan. 6.

**Amanita.** Genus of fungi which includes the three most poisonous toadstools known: *A. phalloides*, the deathcap; *A. verna*, the fool's mushroom; and *A. virosa*, the destroying angel. Two other species *A. muscaria*, the fly agaric, and *A. pantherina*, the false blusher, are harmful to man. One species, *A. rubescens*, the blusher, is edible; *A. mappa* and several other British species are harmless but have a disagreeable taste. The amanitas are gill-bearing, white-spored basidiomycetes. Most species possess a well-defined cup-like sheath or volva round the swollen base of the stem, and parts of the volva may persist as whitish warty areas on the upper surface of the cap. Occasionally the tissues of the volva are fragile and are reduced to a few scale-like concentric markings on the base of the stem.

*Amanita phalloides* has a cap 3 to 4 inches in diameter, the upper surface of which is usually greenish with a darker centre, and peels easily. The colour is sometimes

**Amana.** Village of Iowa co., Iowa, U.S.A., chief of the seven village communities of the Amana society. Near the Iowa river, 20 m. W.N.W. of Iowa city, the settlements have a total pop. of c. 1,400. They were created by the Community of True Inspiration, a German religious sect, founded 1714 in Württemberg. Amana was settled in 1855 and the other villages in the next few years. In 1932 the society was made a cooperative corporation, and religious and economic administration were separated. The villages, with their



islands they found the Turks had fled. The flotilla steamed on, but on June 2 the water proved too shallow for the larger vessels. The smaller craft sailed up the river, and on June 3 General Townshend on the Comet, accompanied by three armed tugs, pushed on to Amara, where he surprised and forced 700 Turks to surrender. On June 4 he occupied the town. The British took 1,800 prisoners and 17 guns, and captured or sank several enemy vessels.

**Amaranth** (Greek *amarantos*, unfading flower). Genus of the family *Amarantaceae*, consisting of annual herbs found in tropical

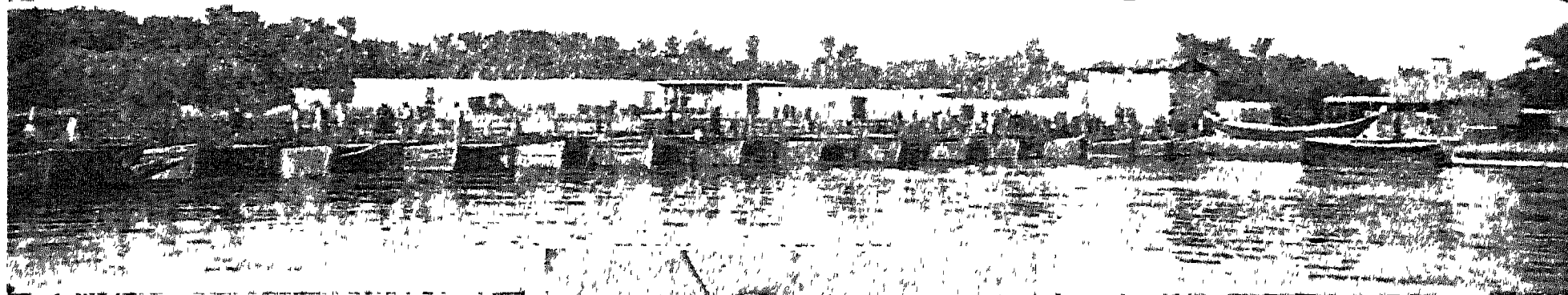
high, it is the loftiest summit of the Maiella range of the Apennines.

**Amaryllidaceae.** Large and important family of flowering plants including more than 60 genera. Many forms are bulbous, the bulb being a shortened stem bearing green foliage and white storage leaves. The flowers, which are borne on leafless stems



Amaryllidaceae. The wild daffodil

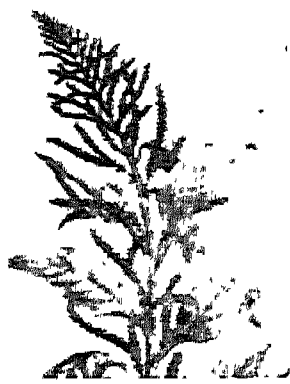
above the perianth. While a few species, such as the daffodil (*Narcissus*) and snowdrop (*Galanthus*), are common in N. Europe, the family is more characteristic of warm and tropical regions, especially of S. Africa. Apart from the species with perennial stems, like *Agave* (q.v.), the period of vegetative and floral activity is brief, and in hot countries follows the rains. During drought the plant is preserved underground in the bulb, which is usually protected against rodents and other enemies by possessing emetic, narcotic, or poisonous properties. Between 600 and 700 species are known.



and warm countries. Individually the flowers are small, but conspicuous by being crowded in long racemes. They have no petals, but the sepals are coloured, and, being of a chaffy consistency, retain their form and colour for a long period, which has made them

popular as garden plants.

Love-lies-bleeding (*Amarantus caudatus*), prince's-feather (*A. hypochondriacus*), and *A. tricolor* are familiar ex-



Amaranth

amples, the last with richly variegated leaves of crimson, yellow, and green.

**Amarapura**, OR THE CITY OF THE GODS. Former capital of Burma. It is on the left bank of the Irawadi, a few miles S.W. of Mandalay. Founded in 1783, it retains few signs of its former prosperity. It was the capital 1783-1823 and again from 1837 until it fell into decay under King Mindon, who in 1857 transferred the seat of government to Mandalay.

Amarapura was overrun by the Japanese in their advance through Burma in April, 1942, but was cleared of the invaders March 19, 1945, by the British 14th army during operations against Mandalay. Amarapura, "immortal city" of Buddhists, suffered little damage.

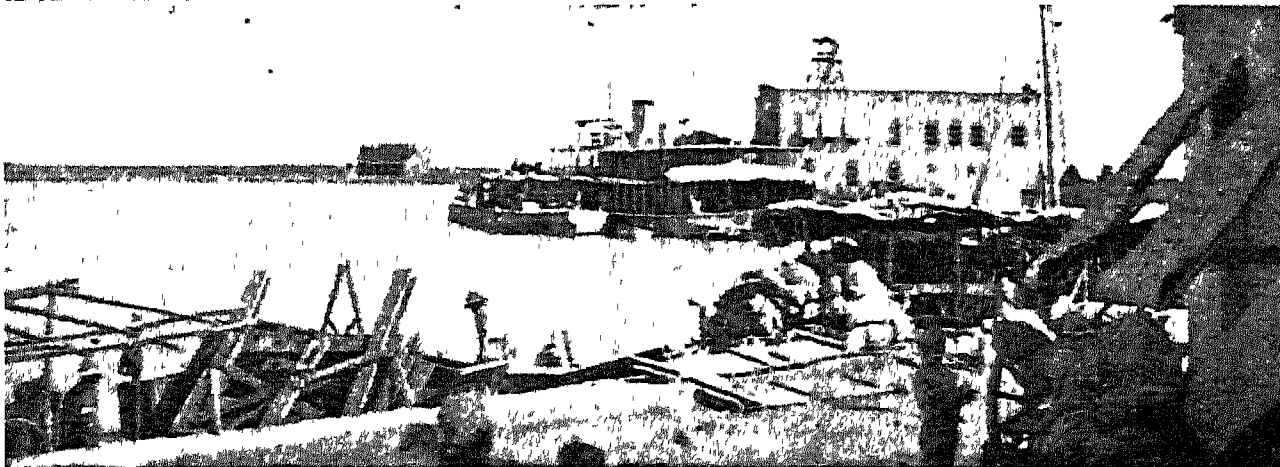
**Amaro.** Mt. of Italy, S.E. of the Gran Sasso d'Italia, and 9,170 ft.



**Amaryllis.** Name of a shepherdess in the pastoral poems of Theocritus and Virgil, used generally for a rustic sweetheart or village beauty.

**Amasa.** Son of Ithra and Abigail, sister of David (2 Sam. 17). He commanded Absalom's army and was defeated by Joab (2 Sam. 18). Pardoned by David, he became successor to Joab, who slew him treacherously (2 Sam. 20).

**Amasia**, OR AMASYA. Ancient town of Asiatic Turkey, capital of the vilayet of the same name. Situated on the Yeshil-Irmak, it was the residence of the kings of Pontus and the birthplace of the geographer Strabo. It is a terminus of one of the chief roads in Anatolia, by which it is connected through the



Amara, Iraq (p. 357). Wharf showing some of the flat-bottomed river vessels. In centre: Arabs on the Tigris. Top: The bridge of boats across the river

(scapes), are six-partite, with no distinction between sepals and petals. In some respects similar to Liliaceae, there is an obvious difference in the flowers, those of the Amaryllids having the ovary below and those of the lilies having it

coast ranges to Samsun. It has large fruit gardens, orchards, and mulberry plantations, and exports silk, silver, copper, and salt. Pop. (vilayet) (1950) 163,494.

**Amasis.** Name of two Egyptian kings. See Aahmes.



Amateur Theatre. Scene from Milton's *Samson Agonistes*, as performed by the enterprising amateur company of the Maddermarket Theatre, Norwich

Terry's daughter Edith Craig, and its productions attracted enthusiastic audiences. One of the most interesting experiments was carried out by Nugent Monck and the Norwich Players at the Maddermarket Theatre, Norwich. This society differed from most amateur dramatic companies in that it had a permanent home, a regular programme, and a professional producer. The company, however, was entirely amateur. The theatre, opened in 1921, was an exact model of an Elizabethan playhouse, and the whole of the Shakespearian repertory and the works of almost every Elizabethan dramatist of note were performed over a period of some 17 years.

Certain educational settlements, such as Citizen House, Bath, and Toynbee Hall, London, became the "Little Theatres" for their various towns or districts. In modern schools, no longer restricted to the annual, stilted "school play," acting came to be regarded as an important educational activity. Children are now more fully enabled to develop and discipline their inherent love of acting, and are increasingly anxious to continue their activity later by association with an amateur society. University amateur dramatic societies rank high, the best known being the Oxford University Dramatic Society (O.U.D.S.), founded in 1885, the Cambridge Amateur Dramatic Club, founded in 1854, and the

Marlowe Society, established in 1907 for the performance of Elizabethan plays.

There remains the largest group, those many societies, often connected with some pre-existing organization, a sports club, a commercial firm, even a church or chapel, whose members practise the dramatic art solely for their own entertainment and that of their friends, with benefit to charities as an additional but incidental justification. It was for such a society that R. C. Sherriff originally wrote *Journey's End* (*q.v.*); and for such societies J. B. Priestley wrote a special play, *Mystery at Greenfingers*. Many authorities have agreed that the amateur stage played no small part in keeping drama alive and vital during a difficult period when it had to face fierce competition from screen and radio.

The British Drama League's quarterly magazine *Drama*, and the N.O.D.A. Bulletin, published three times a year, deal exclusively with the amateur stage in Great Britain, and several popular newspapers give regular space to the activities of the amateur theatre.

Terence Dennis

**Bibliography.** *Stage Setting for Amateurs and Professionals*, R. Southern, 1937; *Problems of Acting and Play Production*, E. C. White, 1939; *Theatre and Stage*, ed. H. Downs, 1951; *Training for the Stage: The Technique of Acting*, D. Birch, 1952; *Stagecraft*, A. J.

Bradbury and W. R. B. Howard, 1953; *Stage Speech*, L. Charteris Coffin, 1954; *Stage Costume*, Margot Lister, 1954; *Lighting the Stage*, P. Corry, 1955; *Running an Amateur Society*, R. Stacey, 1955; *Drama in Schools*, E. J. Burton, 1955.

**Amati.** Name of a famous Italian family of violin makers. They lived in Cremona, and the first of them was Andrea (d. c. 1611). His sons, Antonio (1550-1635) and Geronimo (1556-1630), continued the work and produced some magnificent instruments. Even more successful was Geronimo's son, Nicolo (1596-1684), whose model instrument was known as the grand Amati. His pupils included Stradivari (*q.v.*). The last of the family, Girolamo, son of Nicolo, died in 1740.

**Amatitlán.** Town of Guatemala. It stands on Lake Amatitlán at an altitude of 4,080 ft., 15 m. by rly. S.W. of Guatemala city. It was founded by the Jesuits, and is a market for cereals and fruit. Its former trade in cochineal is dead. Industries are the processing of wool, coffee, and sugar cane. Pop. (1950) 6,683.

Lake Amatitlán is 9 m. long by 3 m. broad. There are sugar and coffee plantations along its shores, and thermal springs which have made it a fashionable resort. It is surrounded by volcanic mountains, and its outlet to the Pacific, the river Michatoyat, has a fine waterfall.

**Amatol.** High explosive used by the British, American, and German armies during the two Great Wars. Introduced by Britain in 1915 and copied by the Germans, it is a mixture of trinitrotoluene and ammonium nitrate, the proportion of the latter varying from 80 p.c. to 20 p.c., and enabling much larger quantities of explosive to be prepared from the nitrocompound available. While not so brisant as trinitrotoluene or lyddite, it is more powerful, and is used as a filling in bombs, grenades, shells, and mines. The nitrate is dried and ground, and then incorporated with the trinitrotoluene by one of three methods.

If the percentage of trinitrotoluene exceeds 45 it is melted and the nitrate stirred in, forming a thin sludge, which can be poured into store and solidifies to a dense mass. In amatols which contain higher proportions of nitrate the ingredients are either milled together as in making gunpowder, or are mixed in a steam jacketed vessel, when the trinitrotoluene melts and



embody a separate system, with Pará near their mouth.

All the above great streams, varying from 500 m. to 2,000 m. long, with their smaller branches, afford access to the remotest parts of the Amazon valley. The conditions of navigability, however, vary greatly according to season, the flood periods adding many thousands of miles to the distances which can be traversed by steamer, canoe, or raft. In very dry seasons the fluvial port of Iquitos is reached with difficulty by ocean steamers. On the Madeira the head of steam navigation is at Porto Velho, above S. Antonio, and 1,000 m. from the main Amazon; and the elevation of the river here is 600 ft. above sea level.

Two flood periods occur annually in the Amazon, influenced respectively by the northern and southern-flowing tributaries. One is in Nov. and Dec., and the other, the principal, from March to June, causing a maximum rise of 45 ft. in the waters of the river. The Amazon, 2,000 m. from its mouth, on the Peruvian frontier at Tabatinga, is 9,000 ft. wide, with a normal depth at that point of 66 ft., and a current velocity of  $1\frac{1}{2}$  m. per hour. Lower down, where the great Brazilian affluents enter, and nearer the mouth, it resembles a sea rather than a river. Tides are felt 500 m. above the mouth where the river is 200 ft. deep; near the main mouth it is 50 m. wide.

Many geographical and scientific expeditions have studied the Amazon and its hinterland in modern times. A British explorer, Col. P. H. Fawcett, was lost with his small party in the Xingú-Tapajos region in 1925. Three years later a relief expedition found evidence that they had met their deaths at the hands of natives.

**Bibliography.** 'The Naturalist on the Amazon, H. W. Bates, 1863; The Sea and the Jungle, H. M. Tomlinson, 1912; Amazon and Andes, K. G. Grubb, 1930; Amazing Amazon, R. and B. Brown, 1943.

**Amazonas.** Largest state of Brazil. Occupying an area of 616,182 sq. m. in the basin of the Amazon, it is densely wooded, especially S. of the river. The rich soil produces rubber, coffee, rice, and fruits, while cattle are extensively reared. Manaus is the capital and chief port. Pop. 511,393.

**Amazonas.** A department of Peru. It has an area of 13,943 sq. m., comprises the upper valley of the Marañon, the head stream of the Amazon, and produces

tobacco and sugar-cane. Pop. (est.) 123,000. Capital, Chachapoyas.

**Amazonas.** A territory of Venezuela. Forming a wedge between Brazil and Colombia, and giving rise to the Orinoco, it is mainly covered with unexplored forests. Capital, Puerto Ayacucho. Pop. (est.) 50,000.

**Amazon Cloth.** All-wool plain dress fabric. It drapes elegantly, and is made usually of S. American merino wool, combed without oil and spun upon mule frames.

**Amazons.** In Greek legend, a race of women warriors, whose kingdom lay on the S. shores of the Euxine or Black Sea. Headed by their queens, they fought against Greece and other states and extended their empire as far as the Caspian Sea. No men were allowed within their borders, and when they wished to have children they visited other tribes. Only the girls were reared. Amazons are represented in Greek art as beautiful women, armed for battle, mounted on fiery horses and trampling on their fallen foes.

Legends without number cluster round the names of the Amazon queens. Thalestris disdained any lesser mate than Alexander the Great; Penthesileia led her hosts against the Greeks in the Trojan War and, dying at the hand of Achilles, drew tears of pity from her slayer. Antiope, won in battle by Theseus, later fought at his side when he undertook a second expedition against the Amazons to help Hercules (Hercules) to obtain the golden girdle of Queen Hippolytē, her sister. Whether the Amazons really existed remains doubtful. Diodorus Siculus speaks of a race of African Amazons, prototypes perhaps of the women warriors of Dahomey. Consult Religious Cults Associated with the Amazons, Florence M. Bennett, 1912.

**Amazon Stone.** Variety of the potash-felspar microcline. Usually of a green colour and occurring as a constituent of coarsely crystalline granites and pegmatites,

it is used in ornaments. It is found chiefly in the Urals, Colorado, and Madagascar.

**Amba Alagi.** Mt., more than 10,000 ft. alt., in Abyssinia, near Magdala, W. of the Eritrean border. It was the scene of the surrender of the duke of Aosta (*q.r.*) and his Italian army in May, 1941. The Italians had been skilfully hemmed into the mountain fastness of Amba Alagi by the Imperial forces, who carried out an ingenious plan with great courage and determination under Gens. Cunningham and Platt. As a result of these operations, the enemy was surrounded by May 15, and the strongly fortified caves of Amba Alagi, at a height of some 9,000 ft., were rendered valueless. On May 16 Aosta sent emissaries to Gen. Cunningham to ask for terms. Unconditional surrender of his exhausted and half-starved men followed; they were granted the honours of war. Aosta, with five generals and other staff officers, was among those who surrendered. Prisoners numbered some 18,000, of whom about 7,000 were Italians. After the fall of Amba Alagi the only Italian stronghold to continue resistance was Gondar (*q.v.*), which surrendered unconditionally after a six months' siege. See East Africa Campaign.

**Ambala.** Div., dist., and town of India, in Punjab state. The div. covers Hissar, Rohtak, Gurgaon, Karnal, Ambala, and Simla dists. In Ambala dist., area 1,850 sq. m., important local afforestation is being developed. The town, a trade centre for grain and cotton goods, makes scientific apparatus and is an important garrison town; the cantonment, one of the largest in India, had a pop. (1951) of 94,043. Chief languages are Punjabi and W. Hindi. Pop. (1951) town, 52,685; dist., 943,734; div., 5,204,618.

**Ambarawa.** Small town of Java, Indonesia, 260 m. E.S.E. of Jakarta (Batavia), with a station on the coast-to-coast rly. During the Second Great War the Japanese set up here an internment camp for Dutch civilians which in Nov., 1945, was savagely attacked by Indonesian terrorists, a number of the inmates being killed. A small force of Gurkhas, part of the British force landed in Java in Sept., reached the camp Nov. 22, severe fighting followed, and it was Dec. 14 before the internees were evacuated to Semarang.

**Ambassador** (late Lat. *ambascia*, mission, agency). Name given to the representative of one



Amazon  
Vatican, Rome

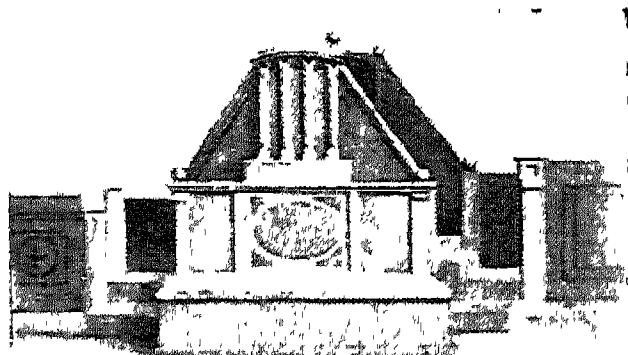
be explained by evidence. Where words in a document are ambiguous, they ought to be interpreted against the person who drew the document.

**Ambivalence.** Psychological term used to describe the co-existence of opposite emotional attitudes towards an object. It was by psycho-analysts used particularly to describe simultaneous love-hate feelings towards the same person, especially a parent, spouse, or child.

**Ambleside.** Market town of Westmorland, England, in the Lakes urb. dist. It is in Rothay valley, at the foot of Wansfell Pike, 1 m. from the head of Lake Windermere. The church of S. Mary, designed by Sir Gilbert Scott, has a memorial window to Wordsworth. On the last Sat. in July a rush-bearing festival is held here. Market day, Wed. Pop. (1951) 2,392.

**Ambleteuse.** Small seaport of France, in the dep. of Pas-de-Calais, 6 m. N. of Boulogne at the mouth of the Slack river. Henry VIII tried to make it into an English harbour on the French coast, but it was recovered by Henry II of France. Vauban was called in to fortify it in 1680. James II landed here in 1688; and in 1803 Napoleon used it in setting up his "Camp de Boulogne," for his intended invasion of England.

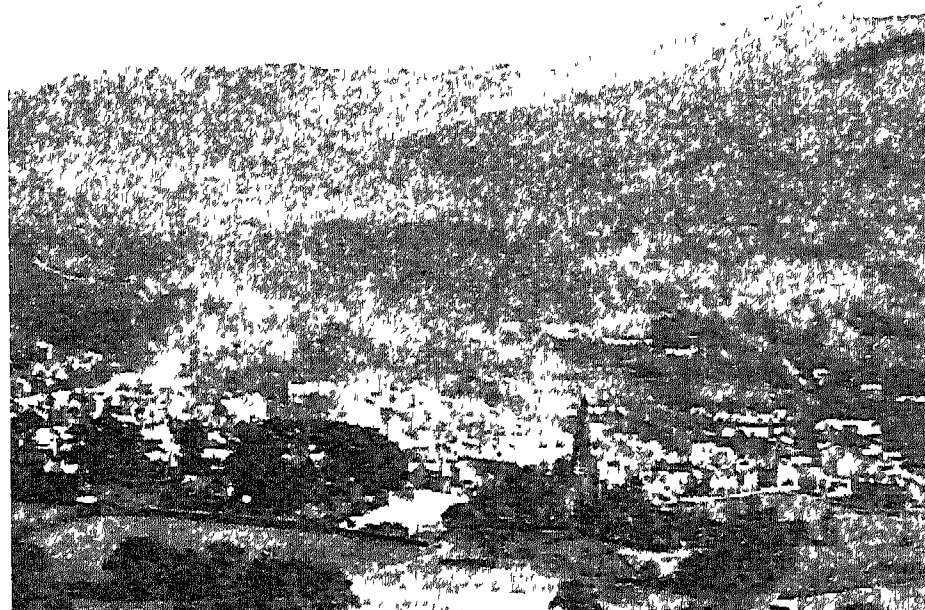
**Ambo.** Rostrum or reading desk with steps whence the Gospel and Epistle were read, notices



Ambo. Reading-desk or rostrum used in early Christian churches

given out, and sermons occasionally preached in early Christian churches. It was superseded by the pulpit. Examples remain in the churches of S. Clement at Rome and S. Thomas, Hanwell, Middlesex. The word ambo, of which the plural is ambones, is variously derived from Gr. *anabeinen*, to ascend, or Gr. and Lat. *ambo*, both or twins—the second because twin pulpits or lecterns were often used in early Christian churches.

**Amboise.** Town of France, in the dep. of Indre-et-Loire. The ancient Ambatia, it is on the Loire, 15 m. by rly. E. of Tours.



Ambleside. Market town and holiday centre of Westmorland. In the background rises Wansfell Pike, 1,587 ft.

It has tanneries and factories making machine tools, agricultural machines, and fishing tackle. Pop. (1954) 6,736. Already fortified in Roman Gaul, it grew in military importance. Charles VIII of France, who was born here and brought back from Italy an army of Italian artists to embellish the castle, was accidentally killed by hitting his head in passing through a low door of his much loved castle. At the invitation of Francis I, who kept a brilliant court at Amboise, Leonardo da Vinci painted here for three years and died in the neighbourhood. Chief features of the castle are the Gothic chapel of S. Hubert, much damaged during the Second Great War; and the three massive round towers, one of which, the Tour des Minimes, has a winding slope up which Charles V went on horseback when visiting Francis I.

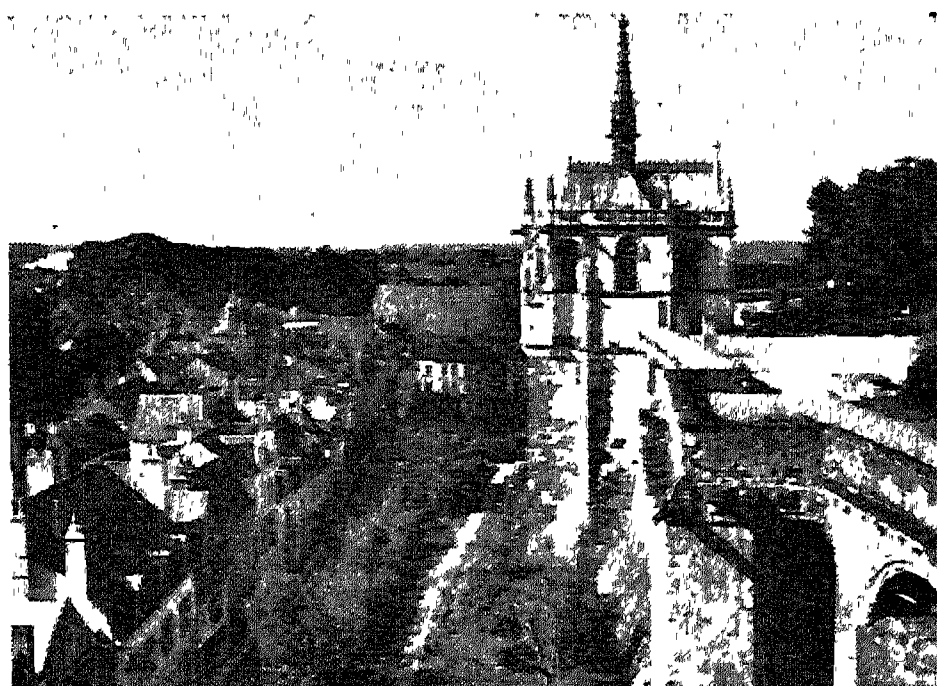
**Amboise, GEORGE D'** (1460–1510). French cardinal, chief minister of Louis XII. Born at Chaumont-sur-Loire, of a noble family, he served as almoner to Louis XI before being appointed archbishop of Narbonne in 1492, of Rouen in 1493. He was made chief minister by Louis XII in 1498 and created a cardinal. He carried out internal legal and ecclesiastical reforms, but his foreign policy, directed towards strengthening French influence in Italy and winning the papacy for himself, was unsuccessful. Rouen benefited by his generosity and by his relief work during the plague in 1504. He died at Lyons, May 25, 1510. His tomb is in Rouen Cathedral.

## Amboyna.

Participants in the last great invasion, before the arrival of the Europeans, of the frontier region of the areas that later became the Belgian Congo and the Anglo-Egyptian Sudan. Under the leadership of their dominant clan, the Avungara, by their outstanding military and political capabilities they

moulded a diversity of peoples into the Azande (*q.v.*). They derived their name from the Mbomu river where they consolidated under King Gura. c. 1755, after earlier migrations.

**Amboyna OR AMBON.** Island in the Moluccas (or Spice Islands), Indonesia, and its capital. The island was discovered in the 15th century by the Venetian navigator Niccolo de Conti. The Portuguese, who landed in Amboyna in 1512, secured a monopoly of the spice trade here. In 1605 they were ousted by the Dutch, who soon afterwards signed a treaty with the Ambonese chiefs which recognized Dutch suzerainty and gave the Dutch exclusive control of the spice trade. This was then confined by treaty to the English and Dutch East India companies, and the Dutch, seeking to eliminate their rivals, in 1623 destroyed the English settlement which had been founded in 1615 at Cambello on the other side of the island from the town of Amboyna; many of the residents were killed or tortured. When England and the Dutch Republic made peace in 1654, Cromwell demanded £300,000 compensation. Dryden in 1673 made this incident the



Amboise. Late Gothic chapel of S. Hubert in the castle of the old French town on the Loire



was nine times as sweet as honey, and its fragrance delicious. Juno and Aphrodite anointed their flowing locks with ambrosia, and in the Aeneid Virgil tells how Venus used it as a salve to cure the wounds of her son.

**Ambrosian Chant.** Term applied to the traditional ritual music of the Christian church, held to have been systematised by S. Ambrose, who probably composed the melodies for his own hymns. Now used only in the diocese of Milan, it was in the late 6th century merged in the Gregorian chant introduced by Pope Gregory the Great.

**Ambrosian Library.** Famous library of Milan. Founded by Cardinal F. Borromeo and named after S. Ambrose, it is housed in a building erected for it 1603-09. It contained 400,000 vols. and 30,000 MSS., including fragments of a 4th century MS. of Homer, a Virgil annotated by Petrarch, an early 14th century MS. of Dante's Divine Comedy, and drawings and MSS. of Leonardo da Vinci.

In the Second Great War the most valuable material was removed to safety, but there was some loss by fire of the remainder.

**Ambrosius, AURELIANUS.** A leader of the Britons during the 5th century. Of Roman descent, he drove the Saxons back to the Isle of Thanet. His Celtic name was Emrys. Gildas and Geoffrey of Monmouth refer to Ambrosius as the son of Constantine, emperor of Britain, Gaul, and Spain, and state that he was poisoned by a Saxon at Winchester.

**Ambry, AUMBRY, ALMERY, OR ARMALIORUM** (Lat. *armarium*, cupboard, or safe). In medieval churches, a cupboard or niche in a wall with shelves for the sacred vessels, the Host, holy oil, etc. Large churches might possess



Ambry. Two examples of this form of cupboard or niche in a church wall

several ambries. In monasteries the word was applied to linen presses or pantries, and is still used in this sense in Scotland.

## AMBULANCE: FOR SICK AND INJURED

Henry T. Ferrier, F.R.S.A., Officer of the Order of St. John

*This article by the joint secretary of the Ambulance Committee, Order of St. John and British Red Cross Society, and former Director of Transport of Wounded, reviews the development of the ambulance service, military, civil, and civil defence. See also under Nursing; Red Cross; St. John Ambulance Assoc., etc.*

The word ambulance, derived through the French from the Latin *ambulare*, to move about, was originally used to designate a movable hospital. Since the Crimean war, however, it has become a generic term in popular use for vehicles or conveyances of the sick or wounded. The correct military definition of a field ambulance is now a mobile field medical unit.

**MILITARY.** The French army surgeon, Larrey, while serving on the Rhine in 1792, proposed the formation of a field hospital. Larrey conceived the idea of a system of light but strong carriages suspended on springs, in which the wounded could be rapidly collected from the battlefield. His "flying ambulance" was subsequently adopted throughout the French army.

In the meantime no efficient ambulance system was adopted by Great Britain. Throughout the Peninsular war the British wounded were removed from the field of battle on stretchers carried by bandsmen, who took them as far as the first line of surgical assistance, whence they were conveyed to hospitals in the carts of the commissariat, or in bullock waggons. At the outset of the Crimean war, ambulance waggons did not exist in the British army. The wounded were moved in carts drawn by horses, or were seated in cacolets suspended on either side of a mule, and the system broke down to a lamentable extent. An ambulance waggon similar in construction to that used by the French was adopted after Sidney Herbert's commission, 1857-58, and a few British

horse-drawn ambulances were used in the Franco-Prussian war, 1870. From that time to the outbreak of the First Great War no outstanding improvements took place in this form of medical transport.

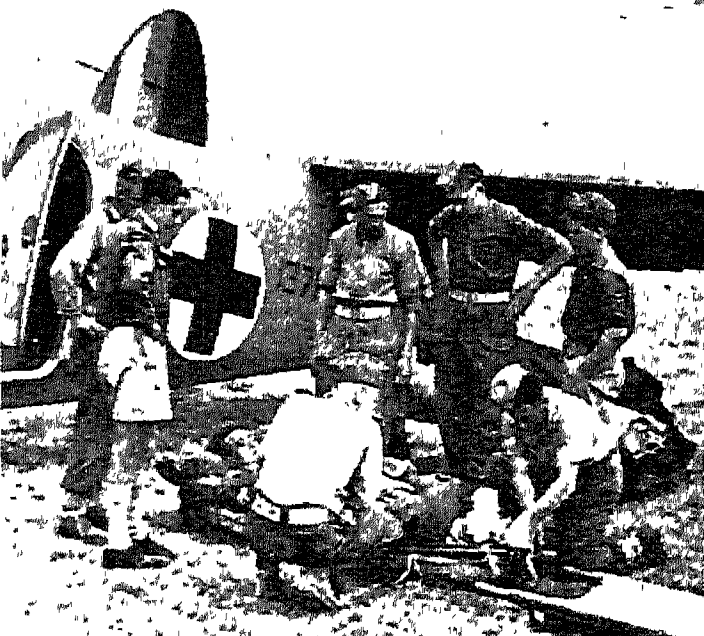
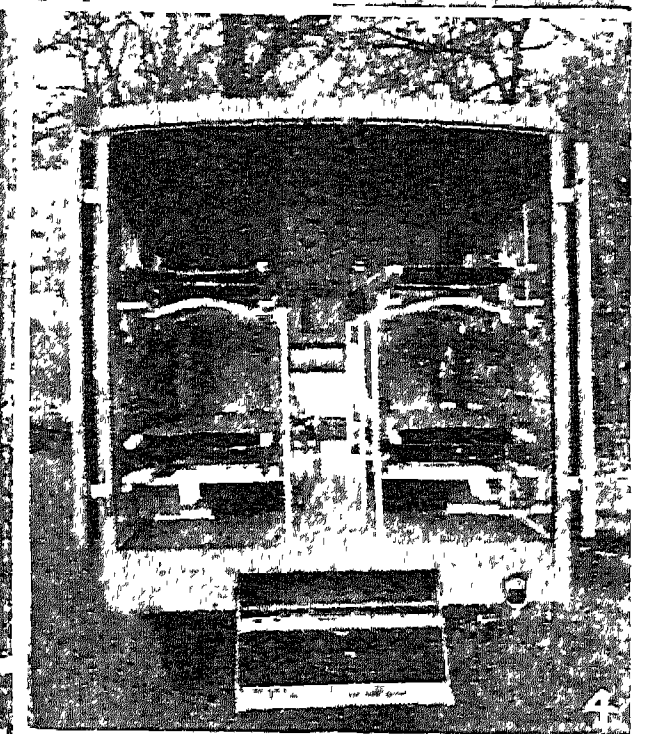
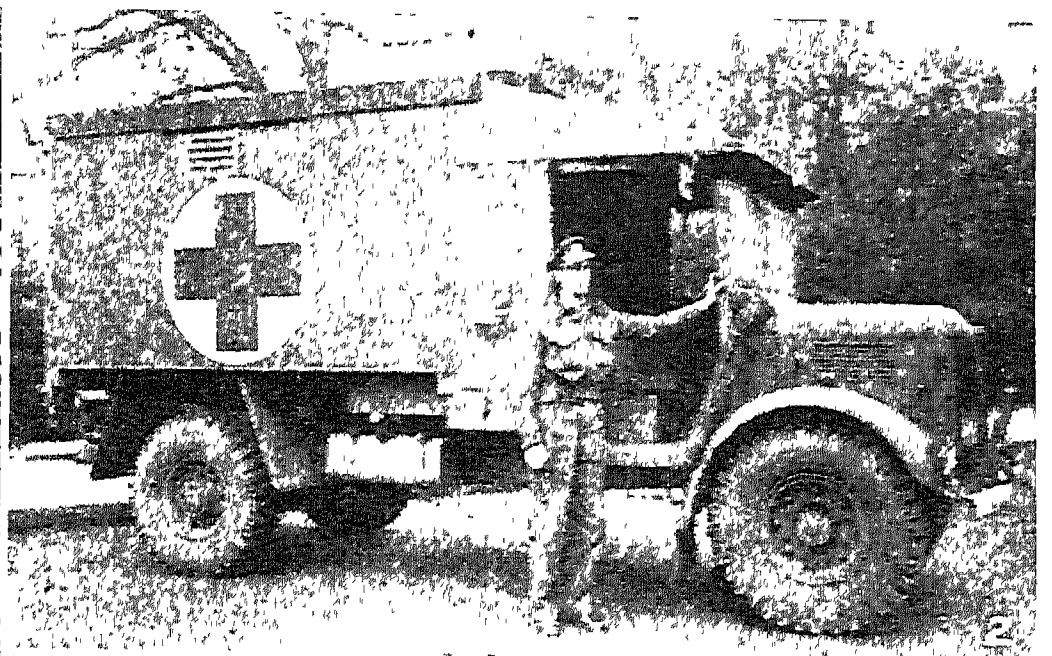
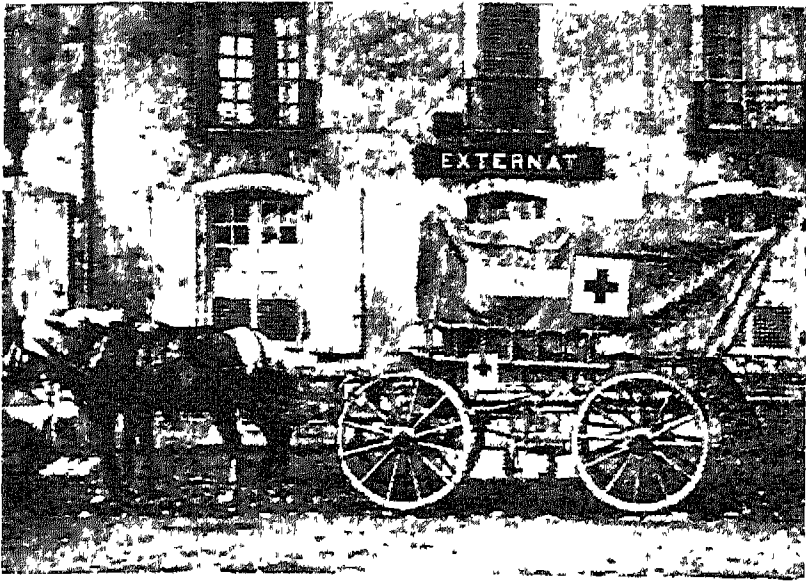
In Sept., 1914, a few members of the Royal Automobile Club offered to place themselves and their cars at the disposal of the Red Cross. The next day several of these cars went over to France. By the end of Jan., 1915, 830 motor ambulances had been landed in France by the British Red Cross. From ten to fifteen tons of spare parts were shipped weekly. In the interests of standardisation the number of varieties of cars was reduced to sixteen. Altogether more than 2,000 cars converted for ambulance work were dispatched, covering every theatre of war. Later the Red Cross units were partly or wholly absorbed into the army medical units under the R.A.M.C. and R.A.S.C. Wide use was also made of motor launches in Mesopotamia, Egypt, the Dardanelles, Malta, German East Africa, and elsewhere.

### Ambulance Trains

The earliest railway ambulance trains were seen during the Crimean war in 1855, the Italian campaign in 1859, and the Slesvig-Holstein war of 1864. But these were primitive adaptations. In 1900 the first train built expressly for the British Red Cross Society was sent to South Africa for use in the Boer war. In 1915 a more completely equipped train constructed by the Birmingham Rly. Co. was shipped to France. In the main the arrangements for the wards followed the design of the train of 1900. The beds were supported on brackets in tiers, and were capable of being removed and used as stretchers, the patient thus being placed in his assigned berth without change. The wards were constructed for 36 patients. A main kitchen, surgery, subsidiary kitchen, mess, and sleeping accommodation for the staff were also provided. The ambulance trains used in the Second Great War did not differ materially. Equipment was more modern and elaborate.

The most notable developments between 1939 and 1945 were the use of aircraft in the rapid transport of wounded from the battlefield to home-based hospitals, and the insistence by the War Office on a single standard ambulance in every theatre of war. Built to the design of War Office experts, it was constructed to be





1. British ambulance used in the Franco-Prussian war, 1870-71. 2. Austin 24 h.p. ambulance operated by the army and the Red Cross, 1939-45. 3 and 4. Bedford four-stretcher ambulance: note retractable steps and open doors lying flat against vehicle. 5. W.A.A.F. nursing orderlies tending a patient in an air ambulance.

6. Green Line coaches converted into ambulances: they were extensively used during the Second Great War for bomb victims. 7. Casualty awaiting evacuation from Tunisia during the Second Great War by a Lockheed Lodestar aircraft. 8. One of the ward coaches in an American Army Red Cross train built in Gt. Britain

# **AMBULANCE: VEHICLES AND MACHINES FOR CONVEYING THE SICK AND WOUNDED**



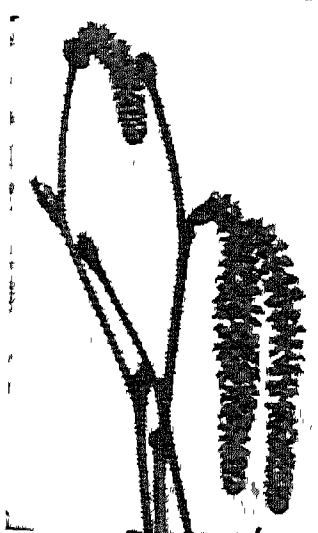


Amenhotep III. Portrait head from a colossal statue of the Egyptian king  
British Museum

exacted tribute from Nubia to the Euphrates, and had princesses of many western Asiatic countries in his harem. Surviving diplomatic letters (*see* Tell el-Amarna) reveal that court luxury led to indifference, and his neglect ruined the empire. The colossi of Memnon at Thebes are all that remains of his vast mortuary temple; temples at Karnak, Luxor (*qq.v.*), and elsewhere were built to the glory of Ammon, the god whom his son Akhnaton later repudiated.

**Amen-Ra.** One form of the name of a deity of ancient Egypt. His nature, worship, and attributes will be found described under his older name Ammon.

**Ament** OR **AMENTUM** (Latin, *amentum*, thong, strap). An inflorescence taking the form of a close



spike, with bracts, bearing many unisexual flowers without petals. Trees that have aments are usually deciduous when mature. The male aments are often pendulous, the female occasionally so. The catkins of oak, beech, hornbeam, and hazel, alder and birch, willow and poplar are examples. These catkin-bearing trees were formerly included in one family, *Amentaceae*, but are now divided into the families *Fagaceae* (oak, beech, sweet chestnut), *Betulaceae* (birch, alder), and *Salicaceae* (willow, poplar).

**Amenti** OR **AMENTET**. The underworld of the ancient Egyp-

tians. This hidden land was inhabited by human souls journeying to the peaceful fields of the blessed. In one account it was traversed nightly by the sun-god Ra; in another the dead soul was weighed in the balance in the presence of its lord Osiris.

**Amercement** OR **AMERCIA-MENT** (late Latin *amerciare*, to fine). Feudal legal term. It was a fine imposed on an offender in lieu of the forfeiture of his goods. The

goods were declared at the mercy of the king, lord, or other legal authority. It was sometimes affeered or assessed by men of the neighbourhood, sometimes by custom. In the 12th century amercements were frequent and excessive, and in 1215, by Magna Carta, the amount of the fine was regulated, but had to be commensurate with the offence. *Consult* History of English Law, Pollock and Maitland, Vol. II, 1898.

## AMERICA : AN INTRODUCTORY SURVEY

Herbert W. Horwill, Writer on American Affairs

*This article deals broadly with the American continent as a whole. More detailed information is given in articles on the main divisions (North America; South America; West Indies, etc.), and the different countries (Argentina; Canada; United States, etc.)*

America has been unfortunate in its name. The term is ambiguous and confusing. Though properly denoting the whole continent, it is more commonly used as a synonym for the United States of America, constituting only just over one-fourth of its area. Moreover, the name commemorates not the actual discoverer but a later explorer, Amerigo Vespucci, or even, according to some, Richard Ameryk, who financed John Cabot.

There are traditions of visits to America by Norsemen in the 10th century, but it was undoubtedly Christopher Columbus who made the existence of the New World known to the Old. On Oct. 12, 1492, while seeking a new sea route to China and India, he sighted the Bahamas. On his third westward voyage, begun in 1498, he reached the mainland of South America. In 1497 John Cabot landed in what is now Canada. The claim of Amerigo Vespucci, a Florentine, to have been the first to set foot on the mainland of the continent is not adequately substantiated. Other notable dates are 1500, when Pinzon and Cabral severally reached Brazil; 1513, when de Leon was the first to explore the Florida coast; 1513, when Balboa (not Cortes, as in Keats's poem) caught a glimpse of the Pacific Ocean from "a peak in Darien"; 1520, when Magellan passed through the strait that bears his name; and 1535, when Cartier sailed up the St. Lawrence.

Little did these 15th and 16th century pioneers imagine what an immense difference their discoveries would ultimately make to the image of the globe. North America covers an area of 8,350,000 square miles; Central

America (including the islands), 308,000; and South America, 7,047,000; making a total of 15,705,000. Thus North America alone is almost twice the size of Europe, and South America is more than 1½ times its size.

Most of the physical features of America are sufficiently indicated by the map, from which it is obvious that many of them are on a large scale. In the Missouri-Mississippi it possesses the longest river in the world—together more than 4,500 miles. This is followed in America by the Amazon, with 3,350–4,000 miles. America possesses no single lake approaching the 170,000 sq. m. of the Caspian in size; but the Great Lakes—Superior, Huron, Michigan, Erie, and Ontario—contribute the quite respectable total of 94,710, and thus constitute the second largest continuous stretch of fresh water in the world. Two cataracts in the Yosemite region head the list of the world's waterfalls in order of height, while Niagara, though far below many others in height and volume, is undoubtedly the most famous of all waterfalls.

Several mountain peaks in the Andes are excelled only by those of the Himalayas. Aconcagua rises to 23,000 feet, and many other peaks in the same range exceed 20,000 feet, as does Mt. McKinley in Alaska. Cotopaxi in the Andes and Mts. Logan and St. Elias in the Rockies are among peaks between 20,000 and 18,000.

Of the climate it need only be said that America offers specimens of every variety of weather and temperature, as might be expected in a continent stretching nearly all the way between the two Poles. Special note should be taken, however, of the effect produced





Christopher Columbus lands on American soil : from a painting by the Spanish artist Dióscoro Puebla Tolin (1832-90), first exhibited in 1862



John and Sebastian Cabot embark at Bristol : from a painting by Ernest Board (1877-1934), exhibited at the Royal Academy in 1906 and acquired by Bristol Art Gallery

AMERICA: ITS FIRST VISITORS FROM EUROPE DEPICTED BY MODERN ARTISTS



**American.** River of California, U.S.A. Rising in three head-streams in the Sierra Nevada, it flows S.W. through deep and narrow ravines to the Sacramento, near Sacramento city. Gold has been found on banks of its head-streams near Folsom. In 1948 construction began of the huge Folsom dam, part of a great irrigation and power production scheme in Central Valley, California.

**American Blight, WOOLLY APHIS. OR MEALY BUG.** Insect (*Eriosoma lanigerum*) of the order Hemiptera which is a destructive pest of fruit trees, feeding on the sap. As in most aphids, winged and wingless forms are found; they are about  $\frac{1}{8}$  inch long, reddish-brown, and the posterior part of the body is covered with numer-

ous wax filaments. These are particularly large in the wingless forms and make them look like specks of cotton wool; they act as a protection against birds. A remedy is to spray in winter or early spring with a proprietary insecticide, or to dab affected areas with a stiff brush dipped in methylated spirit.

**American Bloomery.** Adaptation of the Catalan Forge (*q.v.*) used in the U.S.A. in the production of iron. The furnace hearth is rectangular in section and formed of thick cast-iron plates. The air blast is heated to between 305° and 425° C. by waste heat from the furnace. The hearth is filled with charcoal and crushed ore. This produces a lump of semi-molten iron which is removed and beaten into shape under the hammer.

## THE AMERICAN CIVIL WAR: 1861-65

D. W. Brogan, Author of *Politics and Law in the U.S.*, etc.

*The writer describes in broad outline the struggle between the Northern and Southern States. Further information will be found in articles on the various battles, e.g. Chancellorsville; Gettysburg; Shiloh, and in biographies of Lincoln, Grant, Lee, and others mentioned*

The American Civil War began on April 12, 1861, with the firing on Fort Sumter in the harbour of Charleston, South Carolina, and ended with the surrender of the last "Confederate troops" on May 26, 1865, though all serious fighting, or threat of it, had ended with the surrender of General Joseph E. Johnston to General William T. Sherman on April 18, 1865. The formal cause of the war was the election, Nov. 6, 1860, of Abraham Lincoln as next president of the United States of America on the Republican ticket of opposition to the extension of slavery. (At that time the outgoing president had four months still to serve before his successor took office.)

### Threat to Slave States

The slave states took Lincoln's election as a threat to their social order, and, beginning with South Carolina, they began to secede from the Union. On Feb. 8, 1861, seven states, South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana, Texas, set up a provisional government at Montgomery, Alabama, under a constitution closely copied from that of the United States. Jefferson Davis, senator from Mississippi, was elected president and Alexander H. Stephens, representative from Georgia, was elected vice-president of "the Confederate States of America."

The seceding states began at once to take over federal property

until, at the inauguration of Lincoln, March 4, 1861, only a few posts within them were in Federal hands, one of the most important, symbolically if not strategically, being Fort Sumter in Charleston harbour to which Major Anderson, the Federal commander, had the preceding Dec. removed his tiny garrison from the less defensible Fort Moultrie.

An attempt had been made to provision the fort in Jan., but the supply ship had been driven off. Supplies were now running low and President Lincoln had warned the authorities of South Carolina that food was being sent to Sumter. The Confederate general, Beauregard (*q.v.*), opened fire, and the next day the fort surrendered.

Lincoln at once called on the states for 75,000 volunteer troops. His appeal was enthusiastically welcomed in the North, but was the occasion of the secession of Virginia, Arkansas, Tennessee, and North Carolina. The remaining slave states, Maryland, Kentucky, Missouri, and Delaware, did not secede, although in all of them except Delaware there were large bodies of Southern sympathisers, and many thousands of their citizens eventually fought in the Southern ranks. Nevertheless, the odds were on the side of the North which, with a population of 22,000,000, was opposed in the South by fewer than 10,000,000, of whom more than a third were Negroes whose loyalty was soon dissipated by the hopes of emancipation. The superiority of the North in material resources was even greater, for it was already an important industrial power; and it had the advantage of being the seat of the legal government. Yet the war lasted more than four years, and its issue was in doubt until the last months.

### Task before the North

The first reason for this long resistance of the South was that it had only to resist, to hold its own; the North had to conquer. And the North had to conquer an area of more than 800,000 sq. m., very badly provided with roads and railways, thinly populated, and with few cities or other nerve centres. Even the hundred miles of territory that lay between Washington and the new Confederate capital of Richmond (to which the Confederate government moved after Virginia seceded) was empty and difficult country, a large part of it, often fought over, being known as "the Wilder-



American Civil War. "The Proclamation of Emancipation": from an engraving of a picture of Lincoln and his cabinet painted by F. B. Carpenter at the White House after the issue of the proclamation, Sept. 23, 1862

Run, had conducted a brilliant campaign in the valley of Virginia, and was, till his death, to be Lee's brilliant lieutenant, his "sword-arm."

Jackson's campaign had frightened Lincoln and his advisers, who kept troops behind for the defence of Washington, then called McClellan back from the peninsula below Richmond, and created a new army, the army of Virginia, under General John Pope (1822-92), which was promptly beaten at Second Bull Run (or Second Manassas), Aug. 29-30, by Lee. McClellan was hastily reinstated as head of all the armies, and on Sept. 17 successfully resisted Lee's attack at the battle of Antietam (or Sharpsburg). Although McClellan thus stopped Lee's invasion of the North, he failed to pursue, and was again removed by Lincoln. The new commander, Ambrose E. Burnside (1824-81), launched a foolhardy attack on the Confederate positions at Fredericksburg, Dec. 13, and, though his army numbered 113,000 to the Confederates' 75,000, was defeated with appalling losses.

#### Federal Victories in the West

Equally important but much less noticed was a series of Federal victories in the west. An obscure Federal general, Ulysses S. Grant, took Fort Donelson and Fort Henry, offering only "unconditional surrender," and on April 6 and 7 fought and narrowly won the extremely bloody battle of Shiloh (or Pittsburg Landing), in which Albert Sidney Johnston was killed. Further battles, some formally indecisive, secured the upper waters of the Mississippi system until only the forts at Vicksburg and Port Hudson prevented complete Northern control of the Mississippi from its mouth upwards. And the failure of the Confederate ironclad Virginia (formerly the Federal warship Merrimac) to defeat the new Federal ironclad Monitor meant that the blockade could be broken only by the British and French fleets or by warships bought in Great Britain or France. But the brilliance of Lee's victories dazzled the South and almost led to Anglo-French "mediation" that would have meant Southern independence.

Lincoln replaced Burnside by Hooker, who advanced across the Rappahannock to be completely outmanoeuvred and disastrously defeated at Chancellorsville, May 2-4, 1863. The only bright spot was that Jackson had been accid-



American Civil War. General Grant and his staff at the h.q. of the army of the Potomac, City Point, 1864 : from a contemporary photograph

entally killed by his own troops. Lee now prepared a massive invasion of the North which ended at the battle of Gettysburg, July 1-3, where the army of the Potomac, under a new commander, George G. Meade (1815-72), repulsed the army of Northern Virginia. Lee had to retreat. He was unmolested, but was never again able to take the offensive. On the last day of Gettysburg, the commander of the great fortress of Vicksburg agreed to surrender to Grant, and on July 8, Port Hudson also surrendered, and, as Lincoln put it, "the father of waters flowed unvexed to the sea."

In an autumn campaign, Grant redressed the Federal defeat at Chickamauga by a brilliant victory at Chattanooga, Nov. 24-25, which opened the way into the heart of the Confederacy. Lincoln called him to Washington to take command of all the Federal armies and, after some hesitation, Grant decided to take over the eastern armies and leave the west to his lieutenant, Sherman.

#### North War Weary

From this time, the only hope of the South was in war weariness in the North. Southern hopes of British intervention had faded with the decision of the British government not to permit the sailing of the "Laird rams" to break the blockade (see Alabama Claims). But war weariness was growing in the South, too; conscription was increasingly unpopular; some state governors were increasingly hostile to President Davis, and everywhere the Northern troops penetrated slavery collapsed, for in the Emancipation Proclamation of Sept. 23, 1862,

Lincoln had declared that, from Jan. 1, 1863, all slaves in regions then in rebellion against the Union would be "for ever free."

#### The Unpopular "Draft"

In the North, the "draft" was a particularly unpopular form of conscription as rich men could buy substitutes while poor men had to fight. But the North was enjoying a boom as well as enduring a war, while the South was growing more and more impoverished. Yet until the early autumn of 1864 the South still had a chance to win. Grant, advancing on Richmond, was held up by Lee in a series of brilliant defensive battles that inflicted terrible losses on the Federal troops, caused great discontent in the North, and forced Grant to abandon the direct approach and, like McClellan, move his army to the rivers of the seaboard. From these bases he settled down to a long siege of Petersburg, the fortress covering Richmond. His lieutenant, Sherman, advancing on the great railway centre of Atlanta, was held up by General Joseph E. Johnston; he was making very slow progress, and was suffering very heavy losses. Lee, by dispatching Jubal A. Early (1816-94) to raid Washington from the valley of Virginia, caused further alarm and despondency. Lincoln was convinced that he would not be re-elected, and the Democratic platform for the presidential election of 1864 was summed up as "the war is a failure."

Luck changed; Jefferson Davis, a professional soldier by training, replaced the cautious Johnston by the dashing John Bell Hood (1831-79), who attacked Sherman, was badly beaten, and had to give





American Independence. Battle of Lexington Common, April 19, 1775, when General Gage, on his way to Concord, defeated the local militia

*From an old print*

East India Company sent many cargoes of tea to America. It was thought the colonies would feel no grievance; they would pay three pence a pound, while the British consumer paid a shilling, but this forecast proved incorrect.

The real problem was one of political right, and a succession of unpleasant incidents aroused an obstinate temper on both sides. The British Ministry enforced unpopular restrictions on colonial trade. In 1770 a Boston mob attacked British soldiers in the street and the troops fired, with fatal results. In 1772 citizens of Providence, Rhode Island, burned a small British war vessel, the *Gaspee*, which ran aground there and had caused resentment by her efforts to stop illegal trade. In 1773 a party disguised as Indians threw into Boston harbour 340 chests of tea about to be landed from British ships.

Trouble came also from another direction. In 1774 there was a great clamour in the colonies when the British Parliament passed the Quebec Act. It offended colonial thought by its liberality to the Roman Catholic Church in Canada, and it placed the vast hinterland N. of the Ohio as far as the Mississippi under the rule of a despotic military governor at Quebec. The bill, it was said, menaced the liberty and the expansion of the colonies. The climax came when the British Parliament, as a penalty for the riotous incidents in Boston, passed in 1774 a bill closing the port of Boston until it should make amends. General Gage was made governor of Massachusetts, and had at hand a large military force.

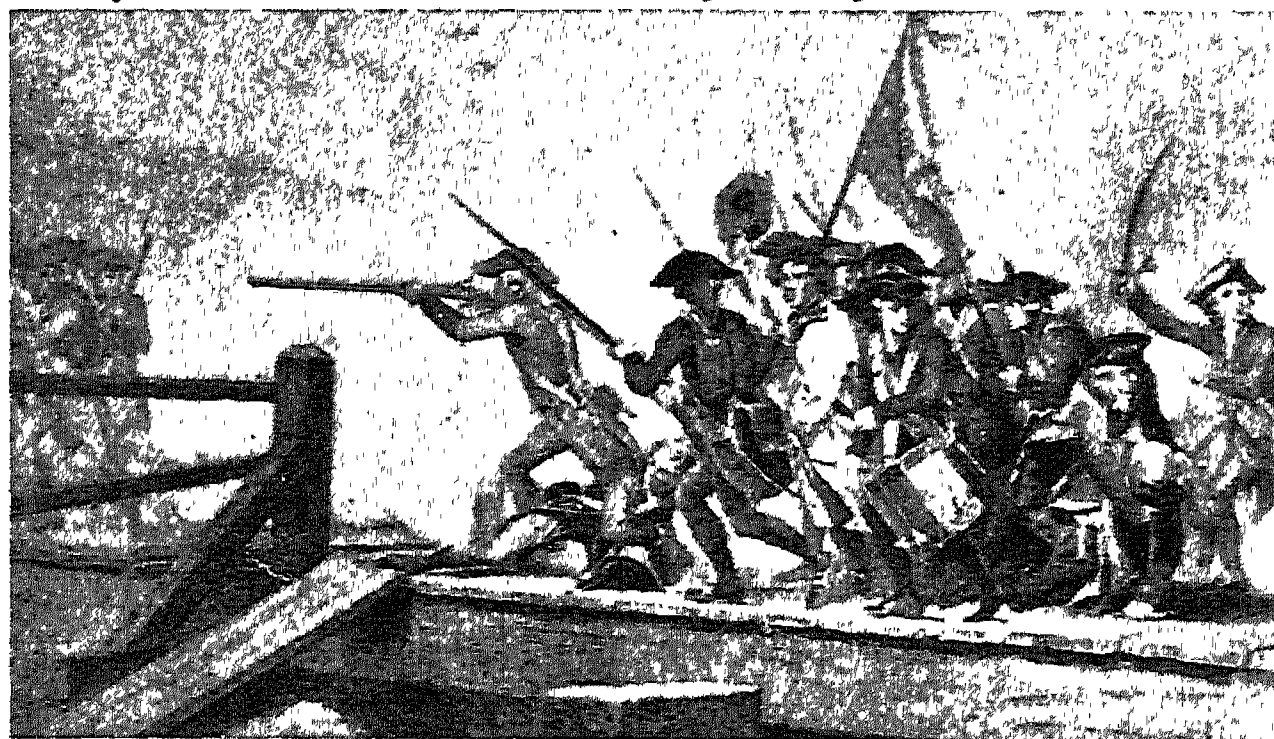
War was now near. With Massachusetts and Virginia leading, a Continental Congress gathered at Philadelphia in the autumn of 1774 to unite the colonies in action.

On April 18, 1775, General Gage sent out a force from Boston to Concord to destroy military stores there. On the 19th the column repulsed an attack at Lexington by 70 armed farmers, and effected its purpose, but was then attacked on the North bridge at Concord, losing 14 men, and returned to Boston under a galling fire. Gage now found himself besieged in Boston. In May the second session of the Continental Congress began at Philadelphia. It made the cause of Massachusetts its own, and on June 15 it appointed Colonel George Washington of Virginia to the command of the colonial forces. While on his way to Boston he received the news of the battle of Bunker Hill. On June 16 the colonists had occupied Breed's (not Bunker) Hill overlooking Boston. Gage dislodged them next day—at the cost of 1,000 casualties in an attacking force of 3,000.

Washington now planned aggressive war. To make the union continental he thought it necessary to occupy Canada. Already in May, 1775, a Vermont leader,

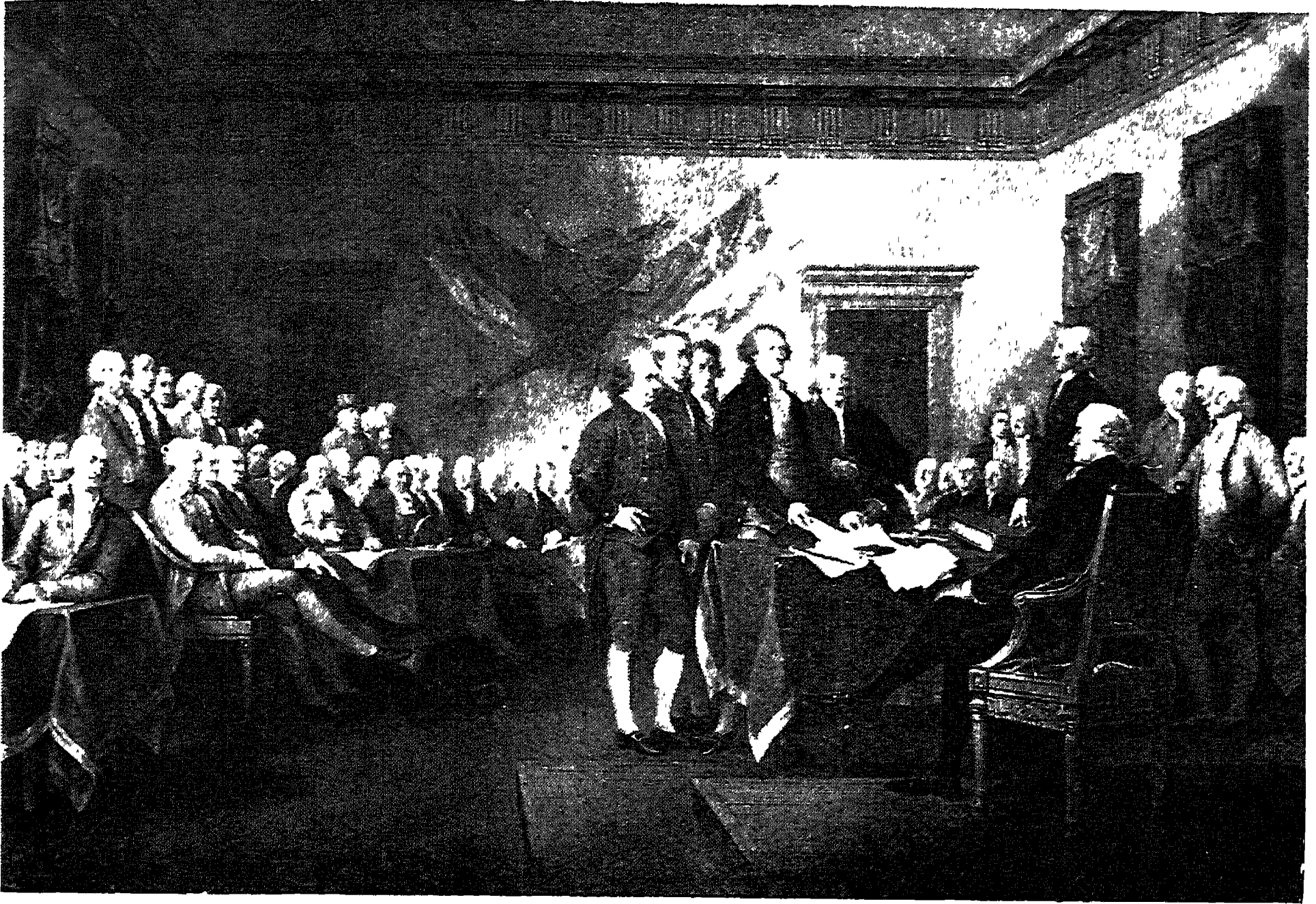
Ethan Allen, had seized Fort Ticonderoga, commanding the route by Lake Champlain to Montreal, and in the late autumn the Americans held the St. Lawrence, with the British garrison under Sir Guy Carleton shut up in Quebec. The sea route to Quebec, however, remained open, and the arrival of a rescuing fleet in the spring of 1776 led to the entire withdrawal from Canada of the American forces. As early as March, 1776, the British evacuated Boston and sailed away to Halifax. Sir William Howe succeeded Gage in the command, and had a bold plan to seize New York and Philadelphia, cut off the North from the South, and conquer the sections in turn. By the middle of Sept. he was in possession of New York after defeating Washington in the battle of Long Island. No reverse, however, could shatter the resolve of Washington to fight on. Congress on July 4, 1776, had adopted a Declaration of Independence, a step which made retreat finally impossible, and its policy now was to make an alliance with France.

Washington's sense of the danger from Canada was justified when a British army under General Burgoyne gathered there and in the summer of 1777 invaded the state of New York by way of Lake Champlain. Had Howe advanced up the Hudson from New York to join Burgoyne, they might have cut off New England from the other colonies. Both leaders were, however, under the control of the English minister, Lord George Germain, and he had not instructed them to cooperate. While Burgoyne invaded New York, Howe was planning to take Philadelphia. In Sept. he threw his force against that place, defeated Washington at the Brandywine, and occupied the city on Sept. 26. The real crisis



American Independence. "Rout of English troops on the bridge at Concord, April 19, 1775": from a contemporary colonial engraving. The British suffered 14 casualties in this engagement





Reproduction of a famous contemporary painting by Trumbull usually called "Signing the Declaration of Independence." In fact it shows the presentation of the Text to Washington. The gathering of signatures went on over several weeks in 1776



British surrender at Yorktown, Oct. 19, 1781: from a contemporary painting. It shows General O'Hara making the surrender on behalf of Cornwallis (who was sick) to Washington and Rochambeau

#### THE WAR OF AMERICAN INDEPENDENCE: TWO CONTEMPORARY COLONIAL PAINTINGS





Full tribal dress of a Sioux chief and his wife ; his head-dress is of eagles' feathers, and he carries a combined pipe and tomahawk. The Sioux Indians lived on the northern Atlantic slope of North America

**AMERICAN INDIANS: A CHIEF OF THE SIOUX AND HIS SQUAW**

To face page 358



leaf-hut, the Guiana pile-house, the Pawnee earth-lodge, the Bororo bachelor-hut, the clustered adobe houses of the Pueblos, and the massive architecture of Mexico and Peru. The art of burning bricks was never attained.

#### Social Institutions

At the time of the discovery the system of clans in which the woman and not the man was the dominating link was giving way in some tribal groups to the opposite system. The Hurons lived in long houses of interrelated families with a matron in charge. The separate family dwelling was rare. Polygamy, where permissible, was in practice limited by ways and means; many tribes are essentially monogamous. Prudential infanticide was practised here and there. Every clan had its totem name, but, except in some N.W. tribes, the totem system as a means to exogamy was less rigid than in Australia. Taboos usually had an exogamous purpose.

Tattooing, although less general than body-paint, was widely spread. This, as well as head-deformation and some other mutilations, probably came across the Pacific. The commoner form of head-flattening was accomplished by pressing cradleboards upon the forehead, as among the Choctaws; a rarer form produced a conical occiput. Initiation frequently involved torture. A poultice of living ants is used in the Amazon forests; red pepper is rubbed into the punctured backs of Carib girls; some young Algonquin braves were lashed to posts by thongs passed through incisions in the breast.

In the hunting communities tribal life tended to retain the primitive form of control by the elders. The confederacies of the N. plains recognized the hereditary principle in the election of chiefs, who among the Iroquois owed their position to the choice of the women. Agricultural land and hunting grounds were held in common by the tribe. On this account the so-called "nations" never reached the form of settled states, except so far as this term applies to the ancient civilizations.

Issues of peace and war were determined at tribal councils, whereat calumet and tomahawk were ceremonial accessories which have given rise to the phrases "the pipe of peace" and "burying the hatchet." In the Iroquois and Muskogee region enemy scalps, as trophies of war, were sometimes mounted on poles for the women's scalp-dances. Wampum comprises strings of shell beads used for orna-

ment and currency, which when formed into belts served as treaty records.

The universal tendance of the dead betokens, with one or two dubious exceptions, a belief in a life beyond the grave. A widespread custom was to enclose the unburned remains in baskets or urns. Cremation was rare, and, apart from the Aztecs, human sacrifice also. The primitive animism brought from Asia developed less into ancestor-worship than into nature-worship. Almost everywhere is found an order of spirit-mediators, usually called shamans, although American shamanism differs radically from the Asian. Some of these mediums discharged the functions of medicine-men as well.

Symbolic dancing was prevalent. Ceremonial halls or medicine-lodges are common throughout the N. The sweat-houses of many tribes had a ritual origin. Drums and rattles were the chief musical instruments; woodwind got as far as the rare whistle and flute, strings as far as the rarer musical bow. The Siouan buffalo dance, the Iroquoian corn dance, and the sun dance of the plains generally were magico-religious manifestations. The Hopi snake dance is a rain-making rite. A universal belief in a Great Spirit is wrongly attributed to N. America. There is a copious mythology of creation legends and explanations of natural phenomena. In 1918 G. W. Cronyn produced a volume of aboriginal American verse entitled *The Path on the Rainbow*, an anthology of songs and chants from the Indians of N. America.

#### The Present and the Future

At the discovery in 1492 the population N. of Mexico is estimated to have been 1,150,000. The number in Canada at the 1951 census was 136,407; in the U.S.A. at the 1950 census it was 343,410. Mexico has perhaps 5,000,000. The number for Central America is put at 9,400,000, for S. America 4,851,000. European and negro immigrations have led to much miscegenation, and this mixed element is a significant factor in the politics of Latin America. The N. American tribes have been placed by the Canadian and the U.S. governments for the most part in reservations. Although some are dying out, the total is recognizably increasing. Outstanding men, *e.g.* Hiawatha, Pontiac, Red Cloud, and Tecumseh, have been prominent in history, not to speak of the Aztec and Inca dynasties. Tammany, a Delaware sachem, is immortalised in a political nick-

name; a Zapotec, Benito Juarez, was president of Mexico. But the Amerind character lacks the quality of permanence in the presence of the more versatile ability of the white peoples.

**CLASSIFICATION OF AMERICAN INDIANS.** Arctic: Long-headed, short (5 ft. 2 ins. to 5 ft. 4 ins.). Eskimos, Aleuts.

N. Pacific slope: Round-headed, medium (5 ft. 6 ins.). Haidas, Tlingits, Nootkas, Tsimshians; Kwakiutl, Salishes.

N. Atlantic slope: Medium-headed, medium to tall (5 ft. 6 ins. to 5 ft. 9 ins.). Algonquian: N., Algonquins, Crees, Ojibwas (Chippewas); W., Blackfeet; N.E., Micmacs; E., Mohicans, (Mahicans, Mohegans). Athapascan: N., Athapascans, Chipewyans, Hares; W., Hupa; S., Apaches, Navahos. Beothukan: Beothuks. Caddoan: Pawnees. Iroquoian: Iroquois (Cayugas, Oneidas, Onondagas, Senecas, Hurons), Cherokees, Mohawks, Tuscaroras. Muskogian: Muskogees, Creeks, Seminoles; Chickasaws, Choctaws; Natchez. Shoshonian: Shoshoni, Comanches, Utes; Hopi. Siouan: Sioux, Assiniboinas, Dakotas, Blackfeet. Zunian: Zuni; Pueblo Indians.

Central: Round-headed, short. Shoshonian: Nahua, Aztec, Pipils. Sonoran: Opata, Pima, Huichols. Huastecan: Huastec, Maya, Quiche, Toltec, Totonac, Chontal and Lacandons. Otomi, Seri; Mixtec, Zapotec; Tarascan; Chorotegan; Nicarao; Sumo-Mosquito.

Andean (S. Pacific slope): Round-headed, short. Chibcha, Guetar, Talamancan, Quichua, Inca, Aymara, Calchaqui.

Forestal (S. Atlantic slope): Round-headed and medium-headed, short. Caraio, Caribs. Tupi, Guarani, Guarayos, Cocamas, Omaguas, Umuas, Chiriguanos, Chiquitos, Mojos, Panos, Caraipunans, Cashibos, Conibos. Arawak, Anti, Warrau, Tacanas, Araunas, Jivaros. Guaycurus, Matacos, Mbayas, Abipones, Tobas; Charruas. Tall: Bororos. Long-headed: Botocudos, Aymores, Tapuya.

Austral: (a) Pampean: round-headed, short. Araucanians, Puelche, Pampas Indians. (b) Patagonian: round-headed, tall (5 ft. 10 ins.). Tehuelche (Patagonians). (c) Fuegian: medium-headed, short (5 ft. 2 ins.). Alakalufs; Onas; Yahgans.

**Bibliography.** Native Races of the Pacific States, H. H. Bancroft, 1874-76; Among the Indians of Guiana, Sir Everard F. im Thurn, 1883; The American Race, D. G. Brinton, 1892; Handbook of American Indians North of Mexico, F. W. Hodge and others, 1907-10; Central and South America, A. H. Keane, 1909-11; We Indians, by the last of the great chiefs, trans. C. Turner, 1931; The Indians of Canada, D. Jenness, 1934; The Indians' Book, ed. N. Curtis, 1937; The American Indian, C. Wissler, 1938; The Savages of America, R. H. Pearce, 1953.



contain few expressions unfamiliar to an English reader. This generalisation, of course, does not apply to the American drama; nor to the American novel, comprising as it does a large proportion of dialogue.

The invasion of England by Americanisms alarms Englishmen who are concerned about the purity of the language. There are some who are afraid that before long the King's English will be superseded by the President's English. The fears, however natural, are not based upon any real cause for anxiety. The process of naturalisation has been going on from the very first, and in the main the language has been enriched by it. It would surprise most Englishmen to learn how many Americanisms, which originally had a hostile reception here, are now a part of their own speech. As late as the middle of the 19th century the use of progress as a verb was deprecated as un-English. Even the most extreme linguistic protectionist does not hesitate today to employ such American neologisms as boarding house, graveyard, outdoors, overcoat, patent leather, and telegram. The American film has exerted a considerable influence, but mainly in the substitution, through its greater picturesqueness and vivacity, of American for English slang. It may be doubted whether, apart from slang, either the Hollywood film or the billeting of U.S. troops in Great Britain has affected the Englishman's speech as much as some suppose. While he no longer needs an interpreter to explain to him what is meant by an elevator or a valise, he has not incorporated these terms in his own everyday vocabulary.

Herbert W. Horwill

**Bibliography.** The American Language, H. L. Mencken, 4th ed., 1936, and supplements, 1945, 1948; A Dictionary of Modern American Usage, H. W. Horwill, 1944.

**American Laurel** (*Kalmia latifolia*). Evergreen shrub of the family Ericaceae, a native of N. America. The leathery leaves are oblong or lance-shaped, the pink or white flowers massed in showy clusters. In a newly opened flower the stamens are held in little

pouches but when a nectar-seeking bee touches their filament they spring out and dust it with pollen. Alternative names are mountain laurel, calico bush, and spoonwood.

#### American Legion.

Organization of Americans who served as soldiers, sailors, or airmen in the First and Second Great Wars. It was founded in Paris in



American Legion.  
Official button

March, 1919, at a meeting of representatives from all the U.S. divisions that had served in France. It was afterwards established in the U.S.A., posts being set up in each state, with headquarters at Indianapolis. In 1955 membership was about 3,000,000.

**American Loan, 1946.** For details of this financial arrangement see under Loan.

**American Museum of Natural History.** Museum in New York, founded in 1869. It adjoins Central Park West at 79th Street. It is not only strong in collections illustrating the fauna of the continent, but contains the Tiffany collection of gems and a unique exhibit of Peruvian antiquities. The Rothschild collection, acquired in 1932, helps to make the study collection of birds the largest in the world, comprising 750,000



American, or  
Mountain, Laurel

specimens. Many specimens of birds, etc., are arranged to show their environment and habits.

**American Notes for General Circulation.** The title of a work published in Oct., 1842, containing Charles Dickens's impressions on his visit to the U.S.A. and Canada in the first six months of that year. Boston, Lowell, New York, Philadelphia, Washington, Baltimore, Cincinnati, St. Louis, Lebanon, Toronto, Montreal, and Quebec were described, as were the Ohio, the Potomac, the Mississippi, Niagara, and the prairie. Dickens's strong criticisms of American institutions were hotly resented, but after his second visit, 1867-68, he arranged that a preface should be added to all subsequent editions stating that his criticisms had no longer any justification.

**American Organ.** Musical instrument of the harmonium type. The wind is drawn through the reeds, not blown through, as in the harmonium, which the American organ has superseded.

**American Volunteer Group.** Group of U.S. airmen in the Second Great War, who resigned U.S. commissions to join the China Air Force and protect the U.S. lease-land convoys passing along the Burma Road. They achieved a remarkable record against the Japanese in Burma, notably at Rangoon early in 1942. Formed early in 1941, under Col. (later Gen.) Chennault, the group was absorbed in July, 1942, into the U.S. Army Air Force in China, where the men were nicknamed the Flying Tigers.

**American War of 1812, THE.** The war of 1812 between the U.S.A. and Great Britain opened with the passing of a declaration of war by Congress on June 18, 1812, and ended, formally, with the signing of the treaty of Ghent, Dec. 24, 1814. The treaty that ended the war did not mention the American grievances that had led to its outbreak; and the most famous battle of the war, the defeat of General Pakenham's expedition against New Orleans, Jan. 8, 1815, by Andrew Jackson (*q.v.*) took place after peace had been made, but before news of the treaty had reached North America. The war is sometimes called the Second War of Independence, but it might more truthfully be called the War of Canadian Independence for it decided that Canada was not to be forcibly annexed to the United States.

The ostensible cause of the war was the manner of the exercise of



American Museum of Natural History, New York, housing collections of immense value and interest

Oleons. There were vague plans of appealing to the assumed loyalty to Spain of the Creoles, but there was no "fifth column" in Louisiana, and the British troops, advancing in close order against the Americans entrenched behind cotton bales, were swept away by the deadly rifle fire of Andrew Jackson's frontiersmen.

The results of the war were few. The most important was the destruction of the U.S. dream of an easy conquest of Canada. The war ended whatever hopes there still remained of creating an Indian buffer state. The bitter squabbles between the weak President Madison and Congress showed that without an effective executive leadership the United States is almost incapable of waging war.

**D. W. Brogan**

**Bibliography.** The History of the Navy of the United States, J. Fenimore Cooper, 1839; History of the United States during the Administrations of Thomas Jefferson and of James Madison, Henry Adams, 1889-91, new ed. 1930; Sea Power in its relations to the War of 1812, A. T. Mahan, 1905; The Diplomacy of the War of 1812, Frank A. Updyke, 1915; Expansionists of 1812, Julius W. Pratt, 1925.

**America's Cup.** See America Cup.

**Americium.** Artificial radioactive element, symbol Am, atomic no. 95, first made at Berkeley, Calif., in 1944-45 by bombarding uranium-238 with  $\alpha$ -particles. It emits X-rays and has a half-life of 500 years.

**Amerighi, MICHELANGELO.** Name of the Italian painter more familiar as Caravaggio (*q.v.*).

**Amerigo Vespucci.** See Vespucci, Amerigo.

**Amerind.** Term denoting the aboriginal American peoples. It was introduced in 1898 by J. W. Powell (1834-1902), director of the bureau of American ethnology, as a compendious synonym for American Indian or Redskin.

**Amerongen.** Village of the Netherlands, in the province of Utrecht. It is 16 m. S.E. of Utrecht and contains the castle of Amerongen, seat of Count Bentinck, to which the German emperor, William II, fled at the end of the First Great War. Pop. (1947) 3,413.

**Amersfoort.** Town of the Netherlands in the province of Utrecht. A rly. junction, on the Eem, 14 m. E.N.E. of Utrecht, it has engineering, food processing, and other factories, and is the market town for the neighbour-

hood. It received a city charter in 1259. It has an old church tower, left standing after the church was destroyed by an explosion; the Great Church (S. George's) dates from 1248. Part of the ancient walls, one old town gate, and two water gates still stand. It was the birthplace of John van Oldenbarneveldt. Pop. (1947) 55,996.

**Amersham.** Market town of Buckinghamshire, England, 24 m. W.N.W. of London. Served by rly. and London Transport, it has chair and straw-plait factories, flour mills, breweries, and a centre for distributing radio-active isotopes produced at Harwell. S. Mary's church is a fine old building with brasses and other monuments. In the main street are the market house, 1682, and almshouses of earlier date. The old name, mentioned in Domesday, was Agmondesham. Pop. (1951) 10,894.

**Amery, LEOPOLD (CHARLES MAURICE) STENNETT** (1873-1955). British politician and writer. Born at Gorakhpur, India, Nov. 22, 1873, and educated at Harrow and Balliol College, Oxford, he became a fellow of All Souls and a barrister. He joined the editorial staff of The Times in 1899, acting as its chief war correspondent in the South African war. Elected M.P. for S. Birmingham (later Sparkbrook) as a tariff reformer in 1911, and retaining the seat until 1945, he became first lord of the admiralty 1922, secretary of state for the colonies 1924-29, secretary of state for India 1940-45. He was made C.H. 1945. He wrote the Times History of the S. African War, completed 1909 and published memoirs, My Political Life (two vols.), 1953. He died Sept. 16, 1955.



L. S. Amery.  
British politician

**Ames, LESLIE** (b. 1905). English professional cricketer. Born at Elham, Kent, Dec. 5, 1905, he joined the staff of the Kent county cricket club in 1924 and became a regular member of the county XI in 1926. Although a fine forcing batsman, scoring 2,482 runs in 1932, and 3,058 in 1933, he first played for England as wicket-keeper, against S. Africa in 1929 (having toured Australia in 1928-29 without playing in test matches). That summer he created a record by catching 79 batsmen, stumping

48. In the 1930s England's first choice as wicketkeeper, in 1950 he was the first professional appointed to the M.C.C. selection committee. He retired in 1951 after playing in 47 test matches for England. During his career he had made 37,245 runs, 102 centuries, 700 catches and 415 stumpings.

**Amesbury.** Market town of Wiltshire, England, on the Avon near the S.E. edge of Salisbury Plain. The former Benedictine abbey was traditionally the retreat of Guinevere, wife of King Arthur. Here in 1727 John Gay wrote The Beggar's Opera. There is a large Norman and Early English church. Earthworks known as Vespasian's Camp are probably prehistoric. Stonehenge lies  $\frac{1}{2}$  m. to the W.N.W., Woodhenge 2 m. to the N.E. Pop. (1951) 4,235.

**Amethyst.** Variety of quartz of lilac to purple colour, due probably to the presence of small amounts of manganese. Well-formed crystals are found lining cavities in mineral veins; they often show a zonary structure of alternate dark and light bands. They have a hardness of 7 on Moh's scale. They are found in Brazil, Ceylon, and the Urals. The ancients believed them to be a remedy against drunkenness, their name being derived from Gk. *amethystos*, drunkenness.

Oriental amethyst is a violet-coloured variety of corundum of gem quality.

**Amethyst, H.M.S.** British warship. A frigate of 1,490 tons, her armament including six 4-in. and eight 2-pdr. guns, she was launched in 1943, had a speed of 20 knots and a complement of 192. On April 20, 1949 (when Mao Tse-tung's followers were crossing the Yang-tse-kiang in force), the Amethyst, proceeding up the river towards Nanking with supplies for the British embassy and to protect British nationals, came under heavy fire from Chinese Communist batteries, was severely damaged, and ran aground on Rose I., 75 m. below Shanghai. Other British warships made abortive attempts to reach the vessel. After three months of unsuccessful negotiating for a safe-conduct, the Amethyst's commander, Lt.-Cdr. J. S. Kerans, steamed down the river on July 30, coming under heavy fire at least twice, and succeeded in re-joining the British fleet.

On their return home in Nov., the members of the ship's company, in addition to recognitions of individual feats of gallantry, were

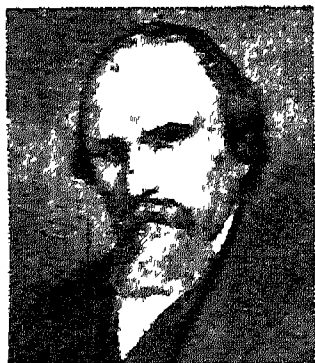


**Amidines.** Organic compounds that contain amidogen ( $\text{NH}_2$ ) and imidogen ( $\text{NH}$ ) attached to the same carbon atom. Acetamidine, for example, may have its formula written  $\text{C}_2\text{H}_6\text{N}_2$  or, to express the constitution referred to above,  $\text{CH}_3\cdot\text{C}(\text{NH})\cdot\text{NH}_2$ .

**Amidol** OR DIAMINO-PHENOL HYDROCHLORIDE. Photographic developer discovered by Gauche in 1869. It is used by dissolving  $1\frac{1}{2}$  gr. in a solution of 48 gr. of sodium sulphite in 1 oz. of water.

**Amidopyrine.** Powerful analgesic drug of the coal-tar group, symbol  $\text{C}_{13}\text{H}_{17}\text{ON}_3$ . White, crystalline, odourless powder, made by the reduction of nitrosophenazone and subsequent treatment with methyl iodide. Prolonged administration may cause the blood disease known as agranulocytosis.

**Amiel, HENRI FRÉDÉRIC** (1821-81). Swiss author. Born at Geneva, Sept. 27, 1821, he was an orphan at the age of twelve. He spent a wandering student life in Germany, Italy, and elsewhere in Europe, contributed to the Bibliothèque Universelle de



Henri F. Amiel,  
Swiss author

Genève, became professor first of aesthetics and French literature and then of moral philosophy at Geneva, and wrote verse, but is best remembered for his posthumous *Journal Intime* of 17,000 MS. pages, 1848-81. Parts of the *Journal* were published in 1883-4, with an introduction by Amiel's friend Edmond Scherer. An English translation by Mrs. Humphry Ward appeared in 1885.

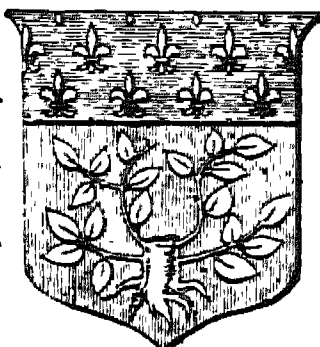
The *Journal*, which has been compared, not very happily, with Sénancour's *Obermann* and Rousseau's *Confessions*, is saturated with the spirit of a devout melancholy, influenced profoundly by Buddhist philosophy and current German pessimism. While an example of the paralysis caused by excessive introspection, it reveals, as Matthew Arnold pointed out in a memorable essay, fine gifts of mind in its literary and social criticism. Amiel died at Geneva, May 11, 1881. Consult *Essays in Criticism*, Matthew Arnold, repr. 1903.

**Amiens.** A city of France. It stands on the Somme, mainly on the left bank, 81 m. N. of Paris, and is the capital of the department of Somme. The river divides into a number of branches, and

these, with its tributaries the Avre and the Selle, form canals in the lower part of the town. It has hence been called the Little Venice. The oldest part of the city is on the right bank; the business quarters are on the left bank and around them are modern suburbs. The old town has narrow irregular streets. Boulevards occupy the site of the old fortifications.

The finest building in Amiens is the Gothic cathedral. It was built mainly in the 13th century and is remarkable for its size, for the wonderful stonework of the W. façade, and for its choir stalls. It was restored by Viollet-le-Duc. Other important churches are S. Germain, S. Leu, S. Rémi, and the modern S. Jacques.

The citadel dates from the 16th century and the prefecture from the 18th. The hôtel de ville has been almost entirely rebuilt. Modern buildings include the palais



Amiens arms



de justice, the public library, colleges, and schools. There are many old houses and some fine squares. The Museum of Picardy has a valuable collection of paintings, antiquities, etc., including frescoes by Puvis de Chavannes. The Promenade de la Hotoie is a fine open space, while

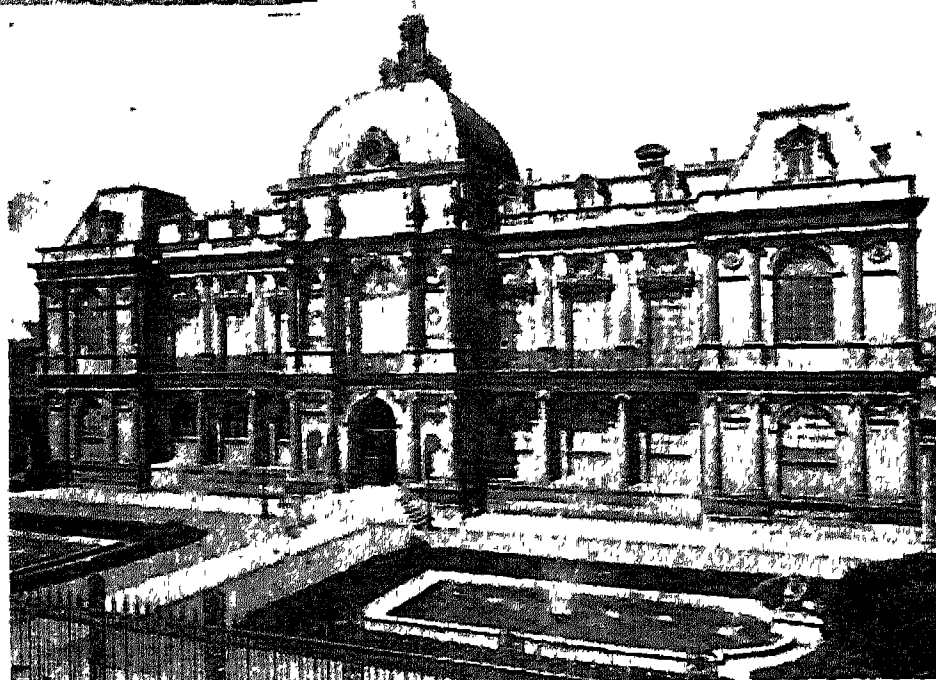
the belfry and the Hôtel Dieu may be mentioned. There is a special workmen's quarter.

Amiens is an important manufacturing and distributing centre. Its industries include the spinning and weaving of textiles—cotton, wool, flax, silk, etc.—and the making of velvet, hosiery, etc. Machinery, chemicals, and sugar are also produced. The industrial importance of Amiens dates from the 12th century, and it is the cradle of the French cotton manufactures. In the neighbourhood to the N.E. market-gardening is largely carried on, and the produce, with that of the local farms, is a considerable item of trade. Amiens is an important railway centre and has quays for the shipping on the river. Trolley-buses run through many of the streets.

#### Amiens in History

Amiens was a Gallic settlement and in the 4th century the seat of a bishop. Later it was part of Flanders until 1185, when it became French. From 1435 to 1477 it was included in Burgundy, but, recovered by France, it was until the Revolution the capital of Picardy. It surrendered to the Germans on Nov. 28, 1870. During the First Great War, after a German occupation that lasted only a few days before the battle of the Marne in Sept., 1914, it became chief centre of military communications in northern France. The German offensive of March, 1918, brought it within gunfire and for several weeks it was in danger. Shells caused some damage to the cathedral. The Allies were unable to use the main trunk line from Amiens to Paris until the battle of Amiens (*q.v.*) finally cleared the town in Aug., 1918.

In the Second Great War, German troops reached Amiens on



Amiens. The Museum of Picardy, built 1854-64; and (above) 16th century portion of the hôtel de ville

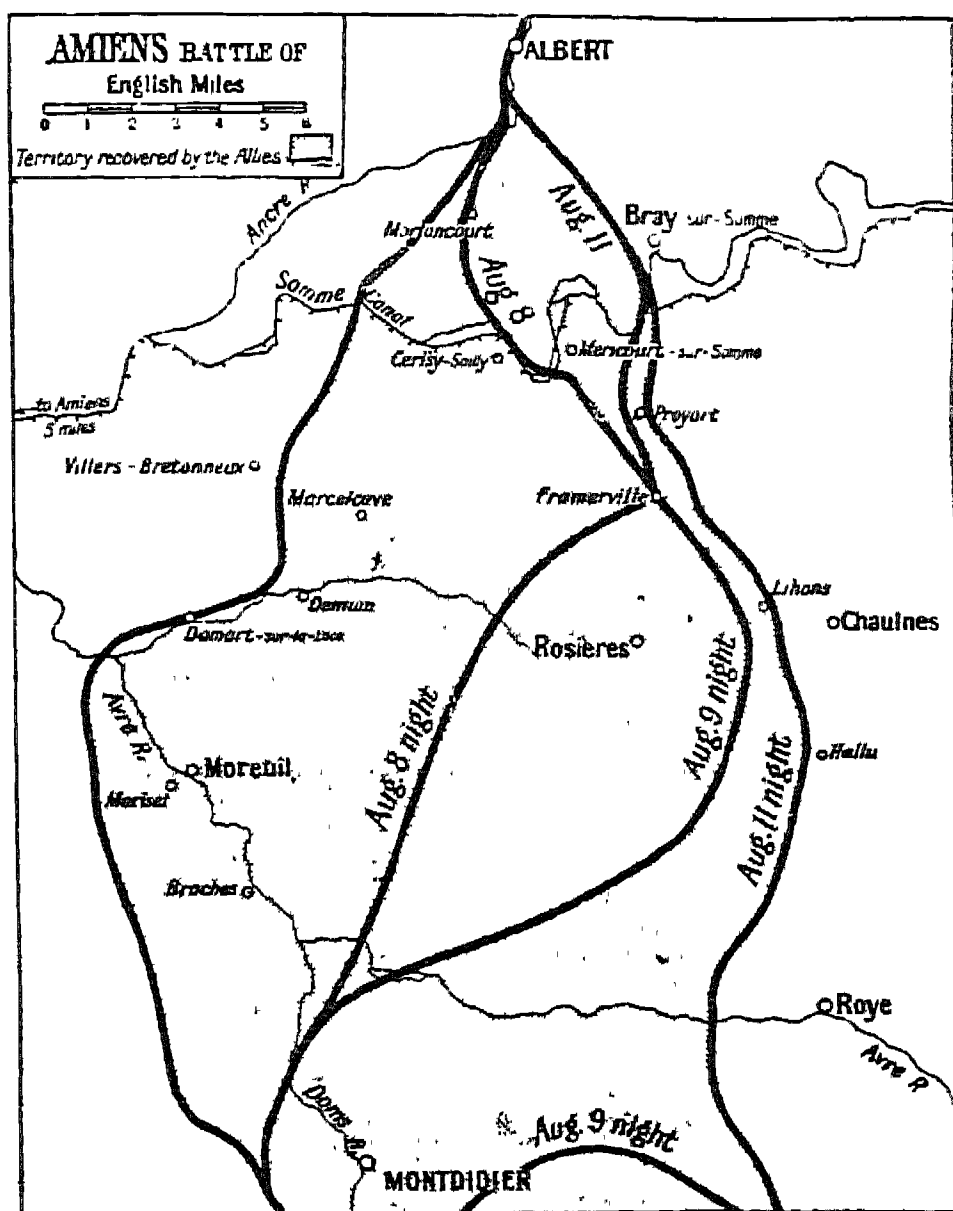
ammunition and the extent of their casualties obliged them to carry out retirements farther north. The prestige of the German staff was shattered; Ludendorff immediately advised his government to make peace. He subsequently referred

to Aug. 8, 1918, as the "black day" in the history of the German army. The effect on the British army was most inspiring. Great success had been won by the skill and determination of the troops, of whom the Canadians and Australians received special praise from Haig. An advance was made to a total depth of 12 miles, such as had been equalled in no previous Allied offensive in the same time. This victory was the more remarkable for two further reasons: it followed the defeats which the British

army had suffered in the great German offensive, and proved that army to be more than a match for the enemy in open warfare, a point on which there had been some doubt.

**Amiens, MISE OF.** Name given to: (1) the reference to Louis IX of France of a dispute between Henry III and the English barons; (2) the judgement awarded by Louis. Henry's misrule at home and military failures abroad, his gifts to foreign favourites and submission to papal exactions, led the baronial party, headed by Simon de Montfort, to take power out of his hands. In 1258 the great council or baronial assembly (afterwards called the Mad Parliament) drew up the Provisions of Oxford and compelled Henry to accept their establishment of a representative oligarchy. Quarrels among the barons encouraged Henry to try to recover his power; he obtained papal absolution from his oaths to observe the provisions, and in 1262 an indecisive civil war broke out. In 1263 it was decided to refer the matter to Louis, whose reputation for justice and piety are thereby

witnessed. The pope's support of Henry, Louis's own conception of kingship, and the fact that the two kings had married sisters, perhaps combined to influence the award, Jan. 23, 1264. It restored full power and jurisdic-



Amiens battlefield, showing the extent of territory recovered from the Germans in four days of fighting

tion to Henry, and was confirmed by Pope Urban IV. The barons refused to accept the decision and the civil war was renewed. See Barons' War.

**Amiens, TREATY OF.** Signed between the U.K. and France on March 27, 1802. Spain and Holland were parties, but merely as vassals of Napoleon. Negotiations began in March, 1801. Napoleon agreed to some concessions, and a preliminary treaty was signed on Oct. 1. The final treaty provided that Malta should be returned to the Knights of S. John, the U.K. should restore all its conquests except Ceylon and Trinidad, and France should compensate the prince of Orange for the loss of his possessions. Egypt was to be restored to Turkey and the Cape of Good Hope to the Dutch, while France was to withdraw from Rome and Naples. The chief representative of the U.K. was the Marquess Cornwallis and of France Joseph Bonaparte. The treaty proved to be merely a truce in the long struggle, for the war broke out again in May 1803.

**Amindivi Islands.** Northern group of the Laccadive coral

islands, which are administratively a part of the state of Madras, India; they lie in the Arabian Sea about 200 m. W. of the Malabar coast. They are five in number—Chetlat, Kiltan, Kardamat, Amini, and Bitra, of which the first four are inhabited and are ruled locally by headmen. The people are Mahomedans, probably originally from Malabar; they speak Malayalam. They depend for their existence upon coconut palms, with which the islands are densely planted; nuts, and, in a smaller degree, coir and mats are traded for rice. Pop. (1951) 7,043.

**Amines.** Organic chemical compounds formed by the replacement of one or more of the hydrogen atoms in ammonia by hydrocarbon groupings; for this reason they have also been called ammonia bases. Amines are classed as primary, secondary, or tertiary according to whether one, two, or three atoms of hydrogen on ammonia are replaced. They can also be divided into aromatic or aliphatic compounds, depending on whether or not an aryl group is included in the substituents directly attached to the nitrogen atom. These two types of amines differ very much in chemical and physical properties: the aromatic compounds are much more important commercially, especially in the dye industry.

With the exception of alkaloids, most of which are heterocyclic compounds, the amines are not very widely distributed in nature. Some of the simpler aliphatic compounds are found as the decomposition products of animal and vegetable organisms; di- and trimethylamine are responsible for the smell of herring brine; methylamine occurs in *Mercurialis perennis*; and trimethylamine is found in hawthorn blossom.

Derivatives of the amines in which a carboxyl ( $-\text{COOH}$ ) group is attached to the same carbon atom as a primary amino group—the Amino Acids (*v.i.*)—are of very wide occurrence in combination.

The most important property of the amines is that they are, like ammonia, basic and consequently form salts. The simpler amines of the aliphatic series are volatile, inflammable substances, which will saponify esters and will precipitate oxides from the salts of many heavy metals. They have a fishy ammoniacal smell and are very soluble in water. All these properties become less with increase in molecular weight. The aromatic





Amman. Street in the modern part of this ancient city, the capital of the Hashimite kingdom of Jordan

Sasso (Aquila province, Italy). During the Imperial and Constantine periods it was a flourishing city. Many Roman remains, including an amphitheatre, aqueducts, and splendid mausoleums, have been found here.

**Amlwch.** Urban district, seaside resort, and seaport of Anglesey, Wales. The port is dry at low water. It is on the N. coast, 24 m. N.W. of Bangor, and is served by railway. It has an old church and some antiquarian relics. Industries include the manufacture of tobacco and the extraction of bromine from sea water. Pop. (1951) 2,700.

**Amman.** Capital of Jordan. The Rabbath-Ammon of the Bible, and the Philadelphia of the Alexandrian Greeks, it is 50 m. E.N.E. of Jerusalem, on the Wady Zerqa. It is on the Hejaz rly., is a road junction, and has an airfield, and is the chief industrial centre of Jordan, with a variety of manufactures, power plant, and printing works. The ruins attract tourists. In the First Great War Amman was an important Turkish base; it was captured by Allenby's troops Sept. 25, 1918. The town grew rapidly after the Second Great War. Pop. (est. 1954) 200,000.

**Ammanati,** BARTOLOMEO (1511-1592). Italian sculptor and architect, born in Settignano, Florence. Follower of Sansovino and Michelangelo, he worked in Florence, Venice, Rome, and Lucca. Among his more famous works are the Neptune Fountain and the Palazzo Pitti in Florence, Palazzo Giugni in Lucca, and the Collegio Romano in Rome.

**Ammanford.** Urban district of Carmarthenshire, Wales, 12 m. N. of Swansea, served by rly. Industries include coal mining and

the manufacture of springs, precision instruments, and furniture. Pop. (1951) 6,576.

**Ammersee.** Lake of Bavaria, W. Germany, 20 m. S.W. of Munich. Formed by the river Ammer, which flows through it from S. to N., it is 10 m. long by 4 m. wide, and is 1,750 ft. above sea level. It is one of the river-formed lakes

which characterise the plateau between the Alps and the Jura, and which drain into the upper Danube.

**Ammeter.** Instrument for measuring electric current. The passage of an electric current through a conductor produces magnetic, thermal, and chemical effects, any one of which can be used to measure the magnitude of the electric current. In a galvanometer the interaction of the magnetic field produced by a current in a coil of wire and the magnetic field of a permanent magnet gives rise to a mechanical force acting on the coil and the magnet proportional to the current. Fig. 1 shows a moving-coil ammeter in which this mechanical force, acting on the coil W, is balanced against the torsion of two phosphor-bronze spiral springs S. The coil, which has a cylindrical soft iron core, is mounted on jewel bearings in the air gap G between the concave pole pieces of the permanent magnet M. The field in the gap is radial and uniform, so that for a given current through the coil the force

acting on the coil is independent of the setting of the coil.

With no current flowing, the pointer P fixed to the coil sets in a position such that the opposed torques of the springs just balance one another. When current is passed through the coil the mechanical force acting on the coil causes it to rotate until this force is just balanced by the mechanical torque produced by twisting the springs. Since this is

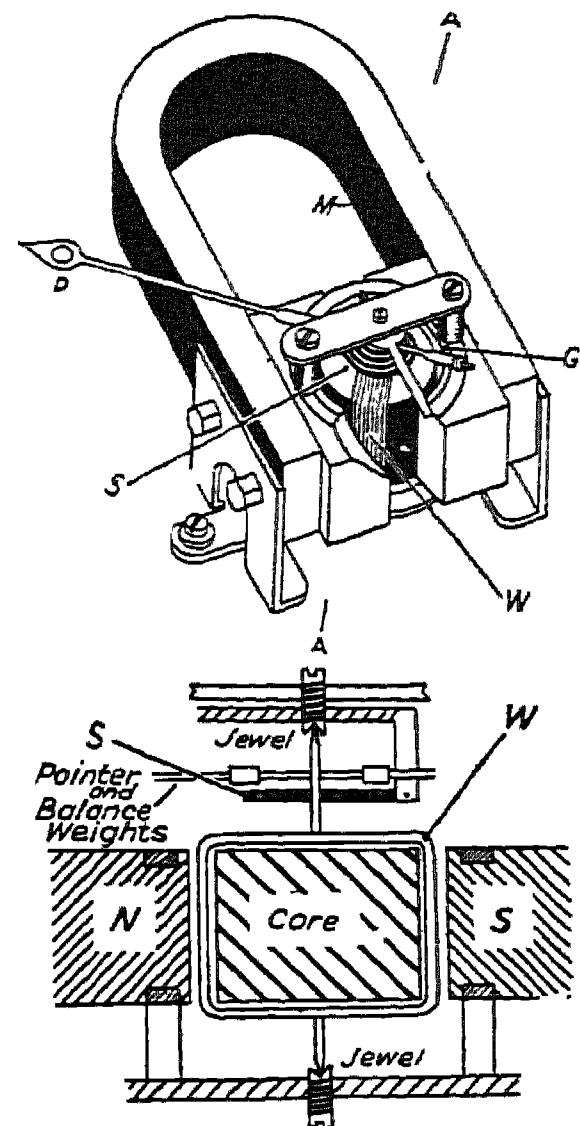
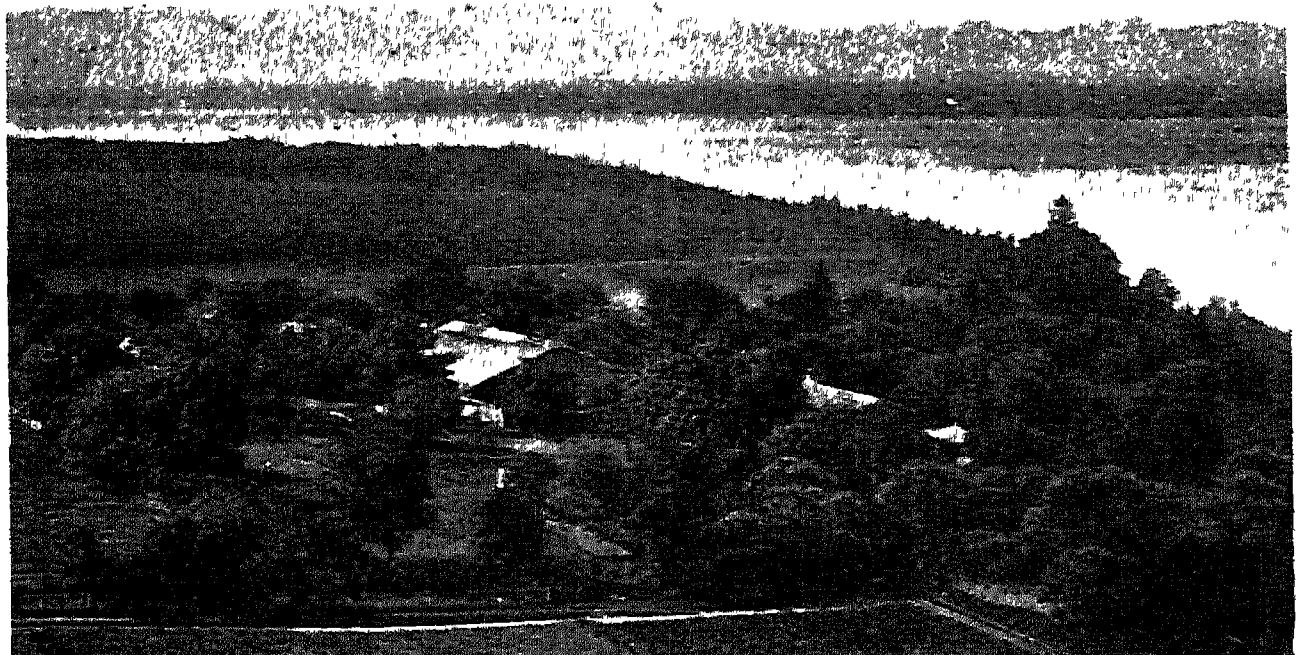


Fig. 1

proportional to the angle of rotation, the angular deflection of the pointer is proportional to the current flowing.

The range of an ammeter can be extended by connecting across the terminals of the instrument resistance shunts which divert known fractions of the current (e.g. 9/10 or 99/100). The moving-coil type



Ammersee. One of the river-formed lakes of the Bavarian Alps, the waters of which flow to the Danube

**Ammonal.** Name given to an important class of high explosives which contain ammonium nitrate and powdered aluminium (hence the name). The use of aluminium in explosives appears first to have been suggested by Escales, a German chemist, in 1899, and patents covering the manufacture and use of explosives of this type were taken out by a Viennese manufacturer, Carl Roth, in 1900. Aluminium is employed on account of its high temperature of combustion, as, the explosion gases being highly heated, greater power is developed by the explosive.

The aluminium is usually prepared by disintegrating a jet of liquid metal with a blast of steam or air. The quantity of aluminium employed varies considerably, according to the purpose for which the explosive is to be used, being as small as 5 p.c. in safety explosives, where it is essential that the temperature of explosion be kept low, and as high as 22 p.c. in military explosives.

The Austrians in the First Great War used ammonal extensively for filling shells and other projectiles, the usual percentages being aluminium 22, trinitrotoluene 30, ammonium nitrate 47, and charcoal 1. In the British service ammonal was very largely used for filling bombs and hand grenades and for mines, the composition being similar to the above; but the trinitrotoluene did not exceed 10 p.c., and the aluminium from 3 p.c. to 15 p.c. of the mixture.

Military ammonal is comparatively insensitive, and it is difficult to ensure complete detonation when filled at high densities.

**Ammon Gelignite.** Blasting explosive used in mines and quarries, and in civil engineering, a cheaper form of gelignite. It contains nitroglycerine and nitrocotton which form a jelly in which are embedded crystals of ammonium nitrate and various combustible materials. The chemical reaction between the combustibles and the oxidising ammonium nitrate provides most of the blasting energy. Polar ammon gelatine dynamite, polar ammon gelignite, and open-cast gelignite contain nitroglycol and do not freeze in cold weather.

**Ammonia** (Greek *ammoniakon*, rock-salt). A colourless gas with a pungent characteristic odour, best known in a state of solution, consisting of water saturated with the gas. Ammonia turns red litmus paper blue and neutralises acids. It is chemically a compound of three equivalents of

hydrogen and one of nitrogen ( $\text{NH}_3$ ). The gas is poisonous when breathed owing to its strongly alkaline properties, which result in the destruction of the mucous membrane. Ammonia is used in the manufacture of fertilisers, as a reagent in inorganic chemistry, in medicine, in dyeing, and in refrigerating plants. It is also of major importance in the manufacture of various explosives.

Although ammonia in some forms, probably a crude sal ammoniac (ammonium chloride), was known to the ancients—Pliny and Dioscorides (*q.v.*) both mention it in their works—it was not until 1774 that the existence of free ammonia was clearly recognized. In that year Priestley obtained the gas in a pure state by distilling sal ammoniac with quicklime and collecting the gas over mercury. Recognizing its alkaline property, Priestley called the gas "alkaline air," but it was also known as volatile air and spirit of hartshorn, having been formerly prepared by distilling hoofs and horns. Its composition was finally established in 1805 by Berthollet, who decomposed it by means of the electric spark.

#### Production of Ammonia

Although ammonia, especially as carbonate, is found almost everywhere in soil, water, and air as a product of the decomposition of organic bodies, none of these natural sources is of any technical importance. Ammonia is produced by two main processes: (1) by direct synthesis from hydrogen and atmospheric nitrogen, (2) from the destructive distillation of coal or lignite. The former process, which has predominated during recent years as a means of producing ammonia, consists in direct combination of the two gases. It was first thought to be impossible to cause hydrogen and nitrogen to combine directly to form ammonia, but in 1913 the first of the Haber-Bosch synthetic ammonia plants became an accomplished fact. The elements may be made to combine by passing the mixed gases, under pressures of 200 or more atmospheres, over a catalyst (*see Catalysis*). Considerable experimentation has been carried out to find the most effective catalysts and a wide range of materials is covered by patents. Most synthetic ammonia plants now in operation employ some form of iron compound for this purpose. Practically all the hydrogen used in ammonia synthesis is derived from water-gas,

coke-oven gas, or the electrolysis of water, while nitrogen is almost all obtained from the air. The gases used in this process require to be of great purity, as the presence of even minute quantities of carbon monoxide renders the catalyst inactive. During the Second Great War a large amount of synthetic ammonia was produced in connexion with the manufacture of explosives. In Canada, for example, where supplementary production was maintained remote from the danger of attack, the regular output of anhydrous ammonia greatly increased. Some Canadian ammonium nitrate was subsequently adapted to meet the peace-time need for fertiliser.

#### Sources and Compounds

The principal source of ammonia was formerly coal, for it is one of the by-products obtained in the manufacture of town gas. Town gas is purified in its making by subjection to cooling and washing processes, the gas-liquor obtained consisting of tar and ammonia. This gas-liquor is either saturated with sulphuric acid to form sulphate of ammonia, or it is subjected to distillation in stills, which work on a similar plan to the Coffey still used in preparing and refining alcohol. A form much used is the Feldman still.

By the interaction of ammonia gas and hydrochloric acid, ammonium chloride ( $\text{NH}_4\text{Cl}$ ), or sal ammoniac, is formed; other salts, such as the nitrate and oxalate, can be made by a similar reaction. Ammonia combines with oils to form a white compound (chemically, a soap); where olive oil is employed, the product is known as hartshorn and oil. Solution of ammonia, *i.e.* the gas dissolved in water, is obtainable commercially in two strengths. The stronger, containing 36.6 p.c. by weight of ammonia, is known as "880," that being approximately the sp. gr. of the liquid. The weaker solution contains 10 p.c. of ammonia, and is sometimes referred to as spirit of hartshorn.

**Bibliography.** Coal-tar and Ammonia, G. Lunge, Part III, 5th ed., 1916; Design and Working of Ammonia Stills, Parrish, 1924; Fixed Nitrogen, American Chemical Society, 1932.

**Ammoniacum.** Gum-resin obtained from *Dorema ammoniacum*, a herb growing in Persia and S. Siberia. It contains some volatile oil, which renders it of use in medicine for stimulating the flow of saliva and gastric juice, but



## AMMUNITION OF VARIOUS TYPES

*This article, classifying many types of military ammunition, is complementary to those on Anti-Aircraft Command; Artillery; Atomic Weapons; Bomb; Explosives; Fuse; Grenade; Incendiary Weapons; Rocket Weapons; Small Arms; Tank, etc.*

The word ammunition is derived from the Latin *munire*, to provide, through the French, in which *la munition* became corrupted to *l'ammunition*. Though it was formerly employed to indicate military stores of all descriptions its present significance as a substantive is limited to warlike stores embodying explosive of any kind or used expendably in direct association with any form of explosive. The adjective in certain instances retains the significance of the older usage, as in "ammunition boots."

**HISTORICAL.** The introduction of explosives can be traced back to the first inventors interested in the possibility not only of breaking up large or small structures by the suddenly liberated energy of the explosive, but also of projecting missiles for distances greater than those attainable by purely mechanical devices. Early in the 14th century gunpowder was used to propel existing types of projectile, *e.g.* arrows, leather-bound to make them a reasonably close fit in the bore of the tubes from which they were projected. Spherical missiles, frequently of stone, appeared in 1340, to be replaced towards the end of the 16th century by metal cannon balls, usually of iron. Lead and iron bullets for small weapons appeared somewhat earlier.

### The Rocket Principle

The possibilities that are inherent in rockets have always interested soldiers, and the application of the rocket principle has developed along lines parallel to the development of the gun. The mistake should not be made of considering the two developments as rivals in a race to achieve the same objective. The capabilities of each are distinct. Later were introduced special missiles, as opposed to the missile whose only offensive power was associated with its kinetic energy. These can best be reviewed individually.

Incendiary missiles first took the form of a projectile treated with an inflammatory coating which was ignited before or as the projectile left the gun. With the introduction of metal cannon, a more reliable effect was obtained by heating the cannon ball to red heat, the pre-ignition of the

propellant charge being prevented by the interposition of a suitable wad between the charge and the heated ball.

Case shot was an attempt to increase the anti-personnel effect of the projectile. It represented a development in shape also, since it was substantially in the form of a thin cylindrical body filled with small missiles. On leaving the muzzle of the gun, the case disintegrated and the contents were distributed over a considerable area fairly close to the gun. To some extent case shot was the forerunner of the shrapnel shell. In its simplest form it has survived for use in certain specific tasks at short range.

Grape shot was intended to produce a short range anti-personnel effect similar to that achieved by case shot; but there was no case.

With chain shot two or more missiles linked by a chain were loaded in the same piece and used where ropes, spars, and wires formed the target, as in the ships of the time. Here, again, the principle persisted until as recently as the First Great War, when it was regularly used against barbed wire entanglements.

Bursting shell, *e.g.* spherical shell filled with a charge of explosive to break them up, were employed as early as 1560. They were time-fused, and their anti-personnel effect was largely discounted by the almost inevitable delay in functioning after arrival. This allowed individuals in the vicinity to take cover. The difficulty was partly remedied in the middle of the 19th century by the introduction, firstly, of a time fuse which was ignited by a cap fired by the shock of discharge in the gun, and secondly, by the introduction of a percussion fuse, which caused the projectile to burst on impact with the target. The earliest types of shrapnel shell were spherical and filled with a mixture of bullets and gunpowder; later, with bullets and gunpowder separately.

**MODERN AMMUNITION.** The development of modern gun ammunition may be said to begin with the introduction, firstly, of the rifled gun, and, secondly, of the principle of breech-loading. The problems of the flight of a

cylindrical projectile, in regard to its stability and the air-resistance encountered, were solved by the production of a cylindrical projectile with a pointed head, having its centre of gravity towards the rear, and caused to follow the trajectory nose forward by imparting to it an adequate rate of spin about its longitudinal axis. The necessity for adequate spin presented mechanical problems as to how this could be imparted during the short time the projectile was accelerating in the gun.

The broad general principle consists in giving the bore of the gun a non-circular longitudinally twisted form, and by reason of the tight fit of the projectile in the bore, forcing the projectile to twist in the gun during its passage up the bore. Many proposals conforming to this principle were put forward. A gun with a hexagonal cross-section to the bore and a correspondingly formed projectile was suggested. Helical grooves (rifling) in the cylindrical surface of the bore were more usual proposals, the grooves to accommodate studs, a layer of soft metal surrounding the projectile or, the modern conventional solution, a ridge of soft metal being attached towards the rear of the cylindrical portion of the projectile, and commonly referred to as the driving band.

### Breech-loading Weapons

The introduction of the breech-loading rifled gun, firing the pointed projectile, gave a considerable improvement in range and in ballistic performance, which set new standards for propellant efficiency and regularity that gunpowder was hardly able to meet. The evolution of the modern types of gun propellant dates from the latter third of the 19th century, and by 1900 the earliest of the present-day nitrocellulose powders and the double-based propellants (cordite) had appeared. Also the evolution of high explosives in the latter part of the 19th century and the development of large scale production introduced entirely new conceptions of explosives. From the effect upon tactics of more efficient weapons, and from the introduction of increased protection against artillery fire, modern gun ammunition has become increasingly specialised in character.

**EXPLOSIVES.** These can usefully be divided, considered as ammunition, into three groups:

(1) The propellants, used to eject a projectile from a gun.

main classes: (a) shot, (b) high explosive shell; (c) carrier shell.

A shot is a projectile in which the effect at the target end is based entirely upon the kinetic striking energy of the projectile. A high explosive shell is used to carry a charge of high explosive to the target where at a selected instant it is detonated so as to produce a destructive effect by reason of the energy imparted to the shell case fragments, or of the blast created, or in some instances by utilising both results. High explosive shell may be thin-walled when not required to penetrate hard targets before detonation of the filling, in which case they are usually nose-fused, or they may be very strong with relatively small cavities when they are required to penetrate hard targets, such as armour plate, and to detonate effectively after penetration. The latter shell are called piercing shell, and are frequently made of special steel, with very strong noses. The fuses in piercing shell are arranged in the base (or rear) of the shell to protect them from the severe stresses to which the nose of the shell is subjected. Carrier shell are employed to convey a filling other than high explosive to a selected point and there to discharge it. Typical carrier shell are smoke shell, shrapnel shell, and star shell.

**TRACERS.** In some applications, the man at the gun wishes to follow the flight of the projectile with his naked eye. To enable him to do this the projectile may be provided with a tracer, or filling of pyrotechnic composition, which burns with a distinctive light of sufficient brilliance to be observable under the conditions of use. The tracer composition may be filled into a cavity in the base of the projectile, or it may be carried in a tracer body secured to the base of the projectile. Either way it is usually ignited by the propellant gases in the gun.

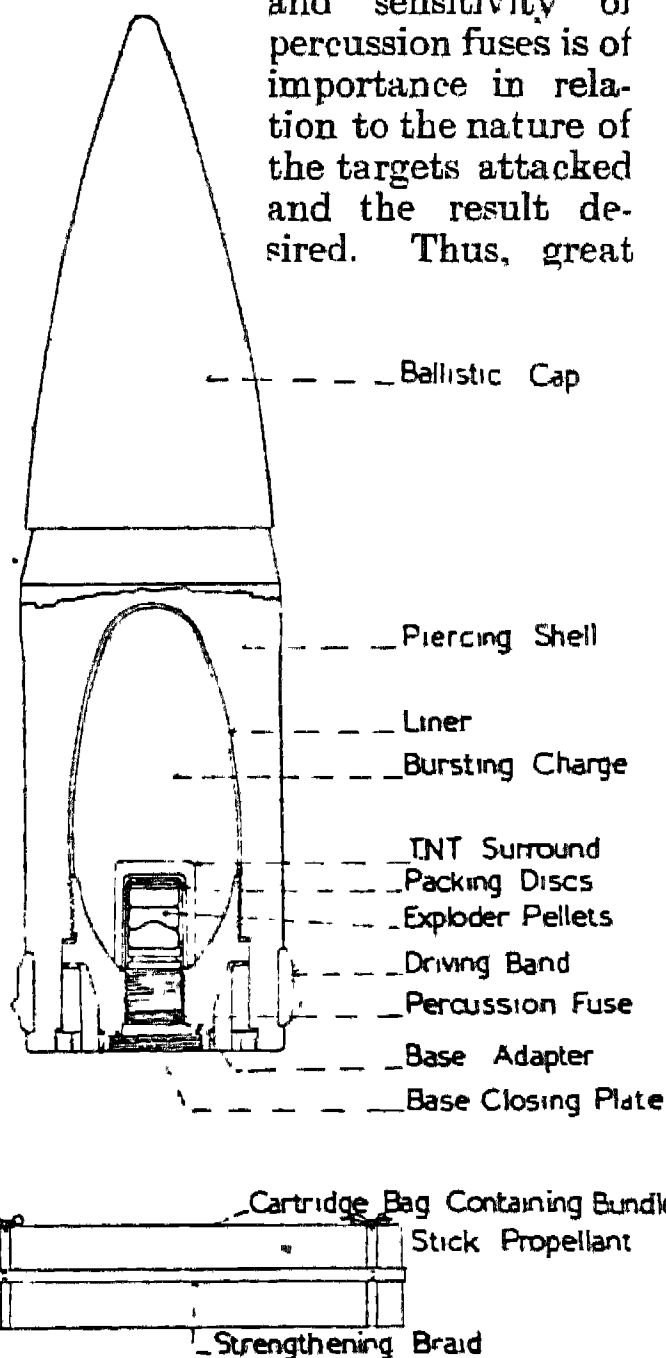
**GUN AMMUNITION FUSES.** The steady development of modern warfare methods has led to the development of an increasing number of types of gun ammunition fuses. These can be classified as follows.

(1) *Percussion Fuses.* These are fuses which function on arrival at a target. There are two sub-divisions: (a) The direct action fuses, which require a blow on a member protruding at the nose of the projectile to cause the fuse to function; (b) The graze fuses,

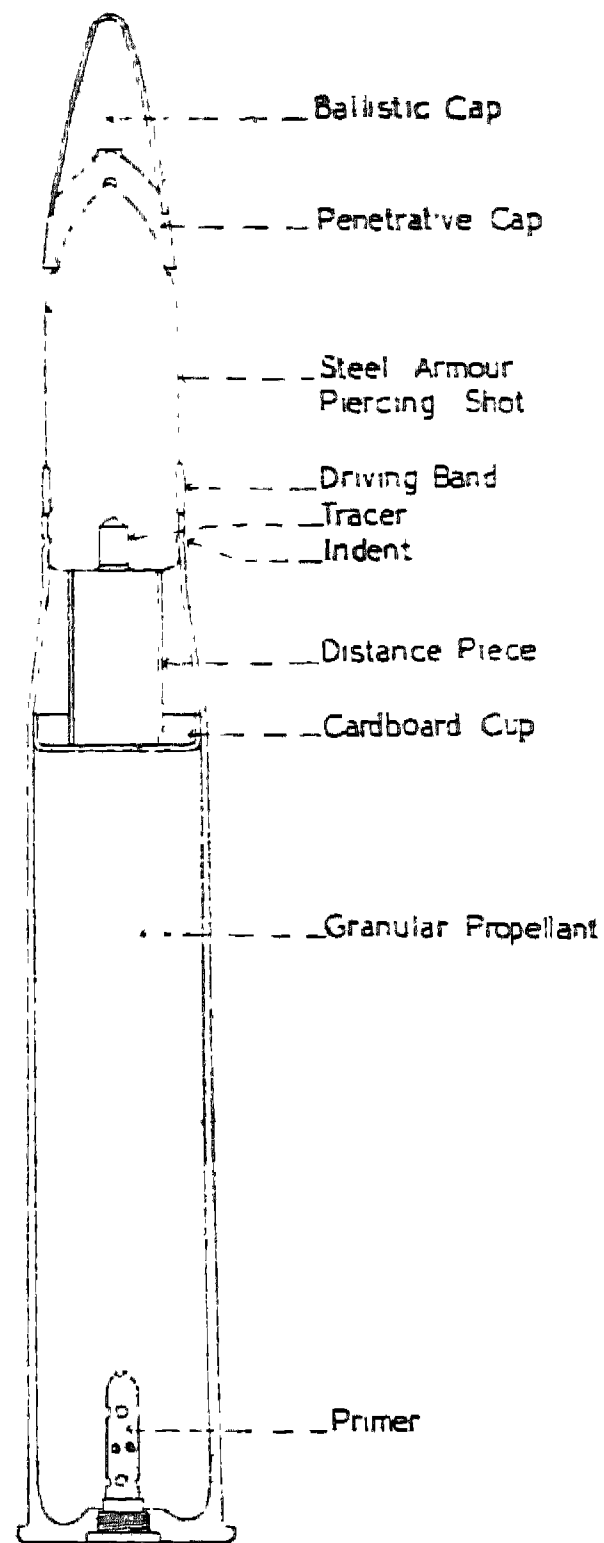
which only require adequate deceleration in the direction of the nose of the projectile to cause the fuse to function.

(2) *Time Fuses.* These are of two main types: (a) The combustion type, which rely upon the steady burning of a powder train the length of which can be varied to give a desired time of burning so causing the shell to function at a pre-determined time after leaving the gun; (b) The mechanical type, which consist of a pre-set alarm clock which is started as the shell leaves the gun and triggers a firing mechanism at the time determined by the setting.

A percussion fuse may have a delaying mechanism designed to provide a short fixed delay in the final functioning of the shell at the target after the mechanical members in the percussion mechanism have been operated, thus allowing penetration of the target before detonation of the shell. All types of fuse may be either disruptive, i.e. suitable for use for the direct detonation of the high explosive filling in a high explosive shell, or igniferous, in which the explosive resulting from the fuse is flash suitable only for igniting the next component in the explosive train. The speed of action and sensitivity of percussion fuses is of importance in relation to the nature of the targets attacked and the result desired. Thus, great



Ammunition. Diagram of an armour-piercing shell and cartridge



Ammunition. Typical anti-tank armour-piercing round

variation in both these characteristics is found between different designs of fuses of this class.

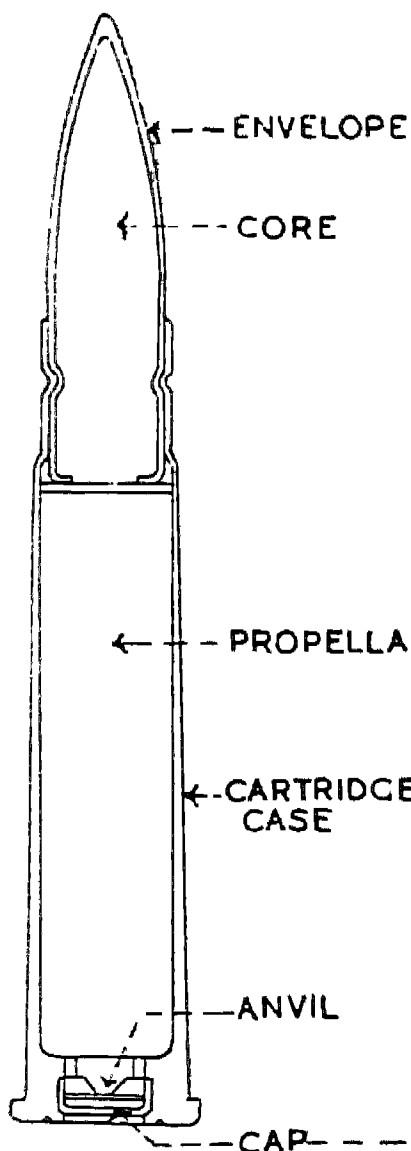
**EXAMPLES OF GUN AMMUNITION AND CARRIER SHELLS**  
(1) Q.F. cartridge with armour piercing shot for attack of armour. In small calibre high velocity guns for attack of armour, the alloy steel projectile with tracer incorporated is secured in the mouth of the cartridge case by indenting the metal of the case into a cannellure in the projectile.

(2) A B.L. round with a piercing shell. In this case the cartridge consists of propellant, usually of stick form, tied into a compact bundle and inserted into a strong, tightly fitting bag of suitable fabric. The igniter, suitably secured to the cartridge, normally takes the form of a thin layer of gunpowder carried in a suitable flat pocket of fabric. The projectile is a piercing shell with a base fuse which may have a delay (possibly optional) incorporated. The piercing shell may also have a penetrative cap of metal on the nose and also possibly a ballistic

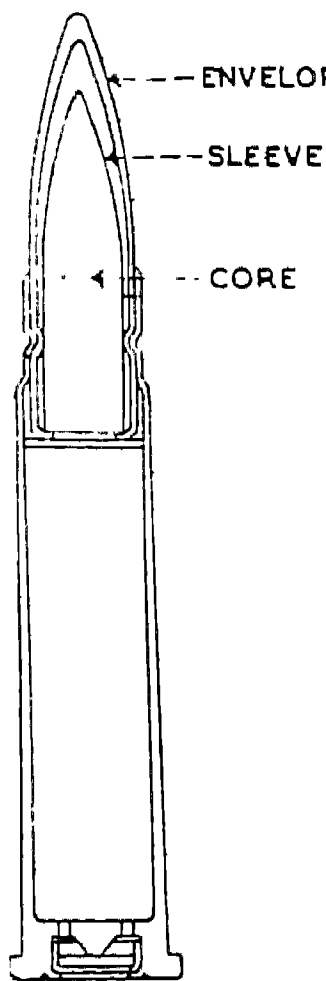


required in various types of machine-gun to indicate the relation between bullet trajectory and the target and so to make it possible to correct the aiming of the gun. Armour-piercing bullets to penetrate light armour, *e.g.* gun shields, have a hard steel core surrounded by a lead sleeve; this assembly is enclosed in

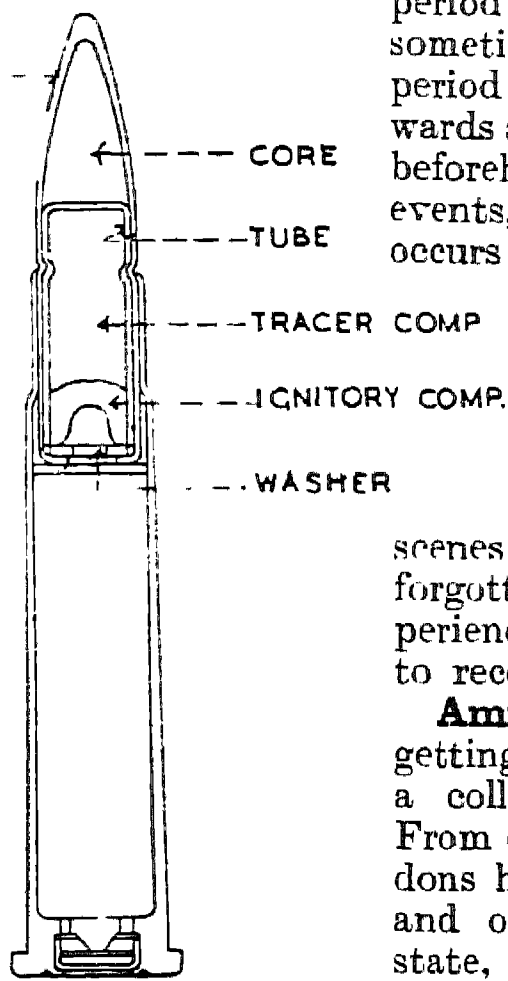
#### BALL ROUND



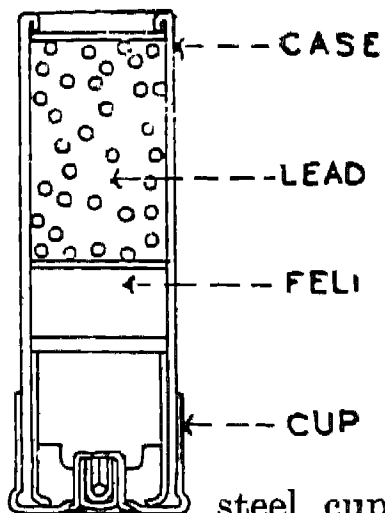
#### ARMOUR PIERCING



#### TRACER



#### SHOT GUN CARTRIDGE



attack of small game, are used under much less stringent conditions than most other types of small arms ammunition and consist of a quantity of lead balls or shot carried in a cardboard case which is reinforced at the base by a brass or steel cup and a compressed paper wad. The propellant—gunpowder—is still used in many of these cartridges—is separated from the shot by a felt wad and is ignited by a cap fixed in the base of the cartridge.

#### ARMOUR PIERCING

**Ammunition.** Sectional diagrams of four types of .303 small arms cartridges as used in the British Services during the Second Great War. See Bullet

#### TRACER

the normal metal envelope, while, in order to attack modern aircraft successfully, 20-mm. ammunition is produced to much the same design as artillery shells with a nose fuse and a filling of H.E. and incendiary composition. In smaller calibres, in which fuses cannot be used, incendiary ammunition has been developed to ignite the petrol which occupies a large volume of all military aircraft.

Pistol and machine carbine ammunition designed for short-range attack differs from the rifle and machine-gun types in having a much smaller propellant charge to project a comparatively heavy bullet at low velocity. Shot-gun cartridges, fired from a smooth bore weapon and designed for the

jury, when the loss covers the period of time of the injury and sometimes a greater or lesser period of time immediately afterwards and, less often, immediately beforehand. An amnesia for recent events, or loss of recent memory, occurs in senile dementia, and leads to the so-called second childhood symptoms seen therein, because old people suffering in this way may imagine that they once more inhabit scenes of their early life, having forgotten their more recent experience, even failing sometimes to recognize their own children.

**Amnesty** (Gr. *amnestia*, forgetting an offence). Term used for a collective or general pardon. From early Greek times such pardons have been granted to rebels and other offenders against the state, the leading culprits being usually excluded. Many governments have granted amnesties, famous instances being the amnesty promised by Charles II on his restoration in 1660, and that declared in 1868 after the American Civil War. See also Indemnity.

**Amnion.** Structure associated with the embryo in many animals, notably most insects and all birds, reptiles, and mammals. It is a living membrane which encloses a fluid-filled space in which the embryo lies during a large part of its development. The function of the amnion and the amniotic fluid is primarily protective. The delicate young embryo floats in the amniotic fluid and is thus saved from collapsing under its own weight. It is also saved from coming into contact with maternal tissues which might, by rubbing against it, cause damage. In mammals the embryo is also protected in this way from the ill effects of mechanical stresses caused by movements of the mother's abdomen. The amnion ruptures at birth and the discharge of the amniotic fluid is a characteristic of the final stage of labour in human parturition.

**Amoeba.** Genus of minute, single-celled animals belonging to the phylum Protozoa. There are several species, mostly occurring in ponds and other water containing decaying plant and animal debris. Some are just large enough to be seen by the naked eye;



Amoeba. Three successive positions of an amoeba in movement. Magnification about 330 times

drives a current of one ampere through a resistance of one ohm. The milliamp, mA (1/1,000 ampere), and the microamp,  $\mu$ A (1/1,000,000 ampere), are used for smaller currents.

In 1950 the ampere was recommended as the fourth fundamental unit of measurement to supplement the metre, kilogramme, and second, and was defined as that (unvarying) current which, flowing in two long straight parallel wires one metre apart, makes them attract or repel (according to direction) with a force of  $2 \times 10^{-7}$  newton (i.e.  $2 \times 10^{-2}$  dyne) per metre. Using this definition and the known laws of electro-magnetism, it is possible to relate absolutely the magnitude of a current to a force by means of a current balance. The accuracy of this measurement is sufficient to determine the absolute ampere as an international standard, and the old standard, the international ampere defined in 1908 as that (unvarying) current which when passed through a solution of silver nitrate in water deposits silver at the rate of 0.001118000 gm. per second, is no longer used.

**Ampère, ANDRÉ MARIE** (1775–1836). French scientist. He was born at Lyons, Jan. 22, 1775. In

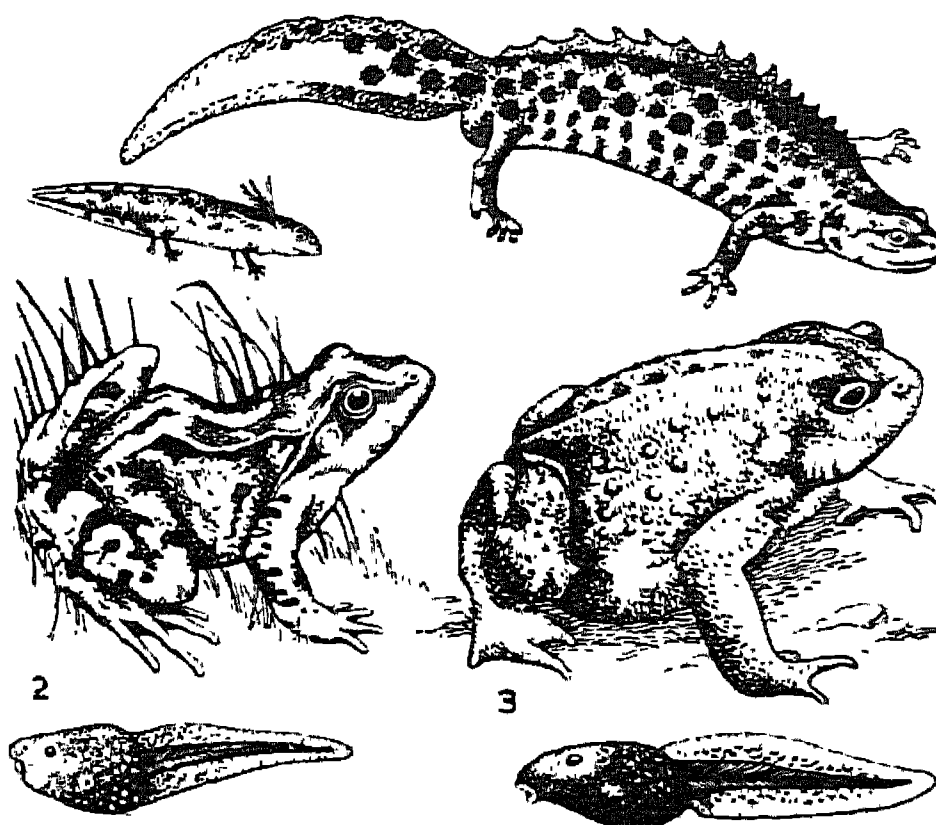


André Ampère,  
French scientist  
After A. Tardieu

1793 his father was guillotined, and from that time young Ampère devoted himself to science. In 1801 he began to teach at Lyons; and in 1805 he moved to Paris, was made a member of the Academy of Sciences in 1814, and professor in the Collège de France in 1824. He died at Marseilles, June 10, 1836. His great work was to establish the nature of the connexion between electricity and magnetism, and to work out the theory of electrodynamics.

**Ampersand.** The name of the sign &, frequently used for "and." The word is of mongrel, Latin and English, origin, being a contraction of the four words—and, *per se* (by itself), and. The sign is a combination of the script letters e and t, *et* being Latin for and.

**Ampezzo.** A district in Belluno prov., Italy. The chief place in the area is Cortina d'Ampezzo (pop., 1951, 6,512), which is situated in the Dolomites, 25 m. S.E. of



Amphibia. 1. Newt; adult male and young one.  
2. Frog and tadpole (below). 3. Toad and tadpole

Bressanone. It is 4,000 ft. above sea level and a tourist centre. The Ampezzo pass, crossed by a carriage road, runs from Dobbiaco to Cortina at an alt. of 5,000 ft. The Ampezzo valley is surrounded by several of the finest summits of the eastern Alps, notably Monte Cristallo, 10,495 ft.; the Sorapsis, 10,595 ft.; Monte Antelao, 10,710 ft.; and Monte Civetta, 10,565 ft.

Cortina d'Ampezzo was the site of the 7th Winter Olympic Games, 1956.

**Amphiaras.** In Greek legend, brother-in-law of Adrastus, the prime mover in the Argive expedition against Thebes. Amphiaras, being possessed of the gift of prophecy, desired to take no part in it, knowing that he was doomed to perish. He went into hiding, but his wife Eriphyle, bribed by Polynices with the necklace of Harmonia, revealed his whereabouts. During the flight of the Argive chiefs from Thebes Amphiaras and his chariot were swallowed up by the earth. After death he was worshipped as a god. His oracle, between Thebes and Potniae, set up on the spot at which he disappeared, was long a resort of those who sought interpretation of their dreams.

**Amphibia.** One of the major classes of the animals with backbones (Vertebrata). It includes all the frogs, toads, newts, and salamanders and a number of legless, worm-like forms called caecilians. Fossils of animals belonging to this class occur in rocks formed in Devonian times (about 300 million years ago); the group is thus an ancient one. The amphibians were the first vertebrates to leave the water for a life on land; but even today few of them are able to live

in very dry places, and nearly all return to fresh waters (ponds, lakes, or rivers) to breed. The eggs, which they lay in water, hatch into larvae popularly called tadpoles, and these lead an essentially fish-like life (possessing, for instance, gills). Changing eventually into the adult form by metamorphosis, they then leave the water, to return, after they have achieved sexual maturity,

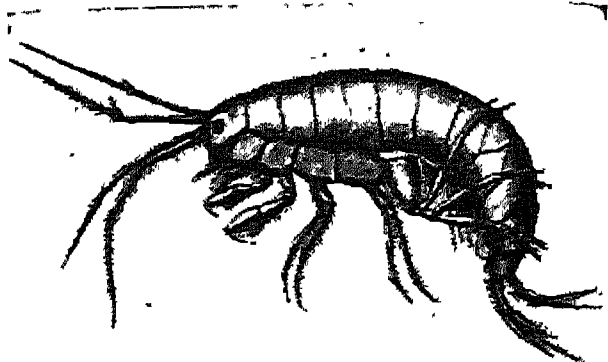
to breed in their turn.

Some amphibians depart somewhat from this pattern of life-history. Thus the African clawed toads of the genus *Xenopus*, and a number of salamanders, do not leave the water after metamorphosis. Among the salamanders the failure to leave the water when adult is in some species associated with an incomplete metamorphosis. In these forms the adult, sexually mature animal may have gills and in other ways seem more like a larva than an adult. Other amphibians are viviparous, i.e. produce live young which have undergone much of their growth and development within the mother's body.

Amphibia are not of great economic importance, though some are eaten and others are used in some of the methods of diagnosing human pregnancy; but their interest for biologists is very great. This springs partly from their evolutionary relationships to other vertebrate groups; for it was from the early amphibians that the reptiles evolved, and from the early reptiles there arose not only the ancestors of the modern reptiles, but also the ancestors of the birds and, separately, the ancestors of the mammals, including man.

All living amphibians fall clearly into one of three groups or orders. The Anura (which include all the frogs and toads) are tail-less when adult, though their tadpoles have a swimming tail which withers away at metamorphosis. They are remarkably uniform in general structure, the most striking feature of which is the short inflexible backbone and the long and powerful hind legs that make frogs successful jumpers and swimmers.



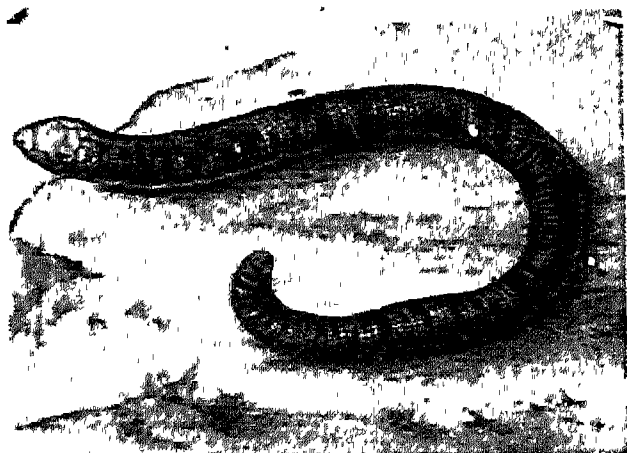


Amphipoda. A fresh-water shrimp, typical example of the order

**Amphipoda** (Greek *amphi*, around; *pous*, foot). Order of small crustaceans with laterally compressed bodies. They have usually six pairs of legs, of which the anterior three are swimming limbs, the posterior being specially developed for use in jumping. They are found in salt and fresh water, fresh-water shrimps, sand hoppers and beach fleas being familiar examples. See Crustacea.

**Amphipolis** (Gr. *amphi*, round; *polis*, city). A town of ancient Macedonia. Formerly called Ennea Hodoi, nine ways, it was situated between two arms of the Strymon. After several attempts the Athenians overcame the original Thracian inhabitants and founded a colony in 437 B.C. Taken by the Spartan Brasidas in 424, Amphipolis refused to return to its allegiance to the mother country. It maintained its independence until 358, when it was occupied by Philip of Macedonia, and remained Macedonian until 168, when it came into the hands of the Romans, who made it the capital of one of their four Macedonian provinces. Favourably situated, in an important strategic position, with its excellent harbour Eion, and rich in oil, timber, gold and silver, it was a flourishing town. Referred to in Acts 17, it is represented by the modern Neokhori.

**Amphisbaena** (Greek *amphis*, both ways; *bainein*, to go). Group of lizards which have the power of moving equally well backwards or

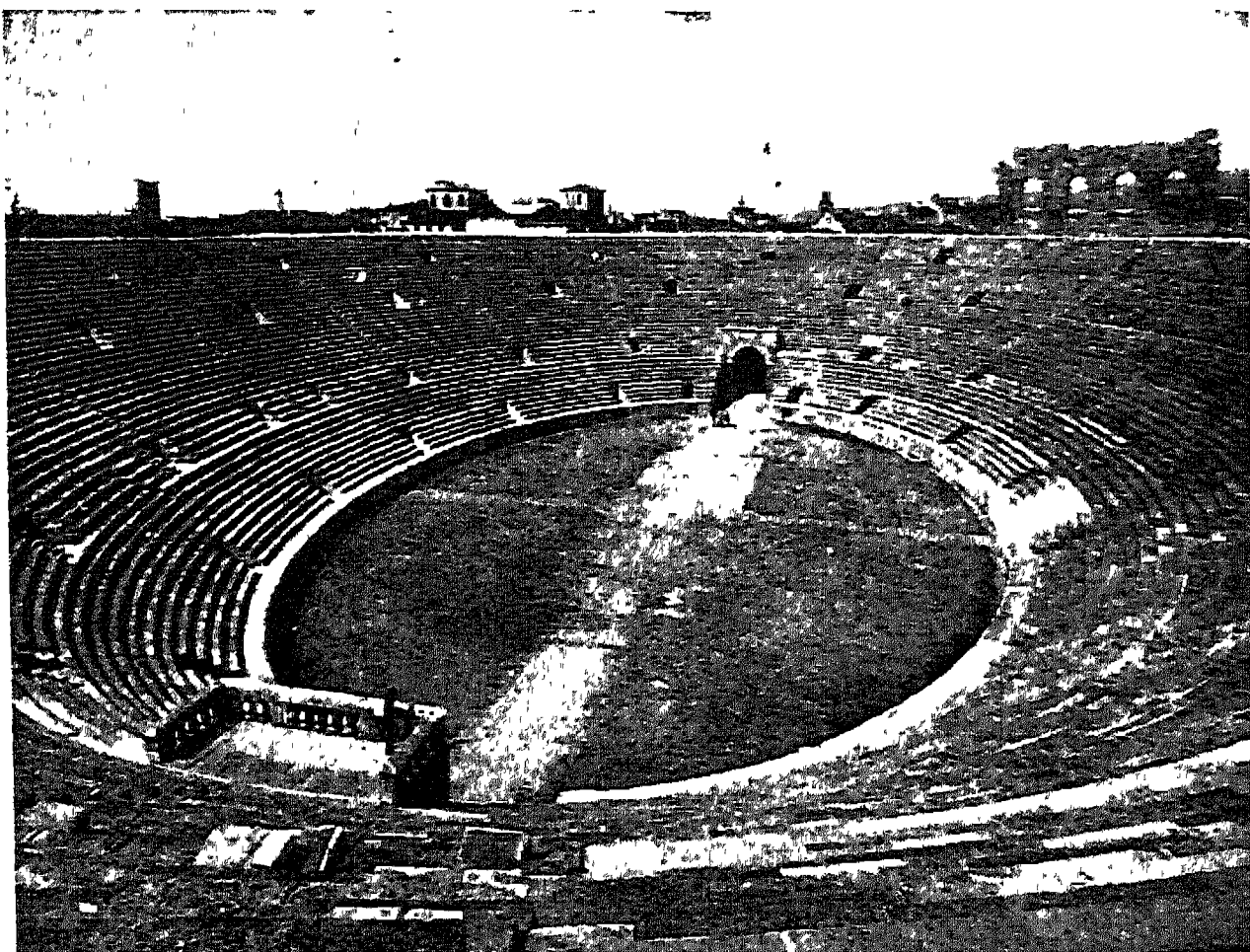


Amphisbaena. A. Americana, one of the legless lizards from Central America

forwards. The amphisbaenae are found in Central America, Africa, and some of the Mediterranean countries. They are wormlike in appearance and live underground. One species has external limbs.

**Amphitheatre** (Greek *amphi*, around; *theatron*, seeing-place or theatre). Structure, slightly elliptical in form, specially designed for the gladiatorial exhibitions of the ancient Roman world. The structure was built round an open space reserved for the combatants. This space, the *arena*, was separated from the spectators' portion (*cavea*) by a wall (*podium*) sufficiently high to protect the spectators from the wild beasts introduced into

form a special women's gallery. Amphitheatres were originally built of wood, the first in Rome being erected by Gaius Scribonius Curio in 59 B.C. The first stone one was built by Statilius Taurus in 29 B.C. The most notable was the Colosseum, or Flavian amphitheatre, built by Vespasian and Titus, to hold some 50,000 spectators. Part of the Colosseum is still standing, and in all parts of the Roman empire in Europe examples



Amphitheatre at Verona, Italy. Built about the first century A.D., but little remains beyond the interior, the seating of which has been often restored

the arena. At each extremity of the arena were doors in the *podium* through which the gladiators and the wild beasts from their subterranean cages entered. From behind the *podium* the spectators' seats rose in tiers. These tiers were divided into several sections (*moeniana*) by concentric gangways, and at intervals in the back wall of the gangway were openings for ingress and egress (*vomitoria*). The *vomitoria* led from the *cavea* into corridors, from which staircases descended to the ground outside the amphitheatre. Opposite the *vomitoria*, cutting the *moeniana* at intervals, were long flights of steps, by which the spectators passed to and from their seats. The *moenianum* nearest the arena was reserved for people of consequence, while the section farthest away from the arena was roofed over in order to

of the amphitheatre, in greater or less degree of preservation, are to be found. The amphitheatre at Verona is one of the best preserved. Other remains are at Arles and Nîmes, France, and Caerleon, England. Gladiatorial shows in the amphitheatre were prohibited in A.D. 404, but contests with wild beasts continued for more than a century afterwards. The term amphitheatre is sometimes applied in the modern theatre to rows of seats immediately below the gallery.



Amphitrite, wife of the Greek sea-god Poseidon  
Villa Albani, Rome

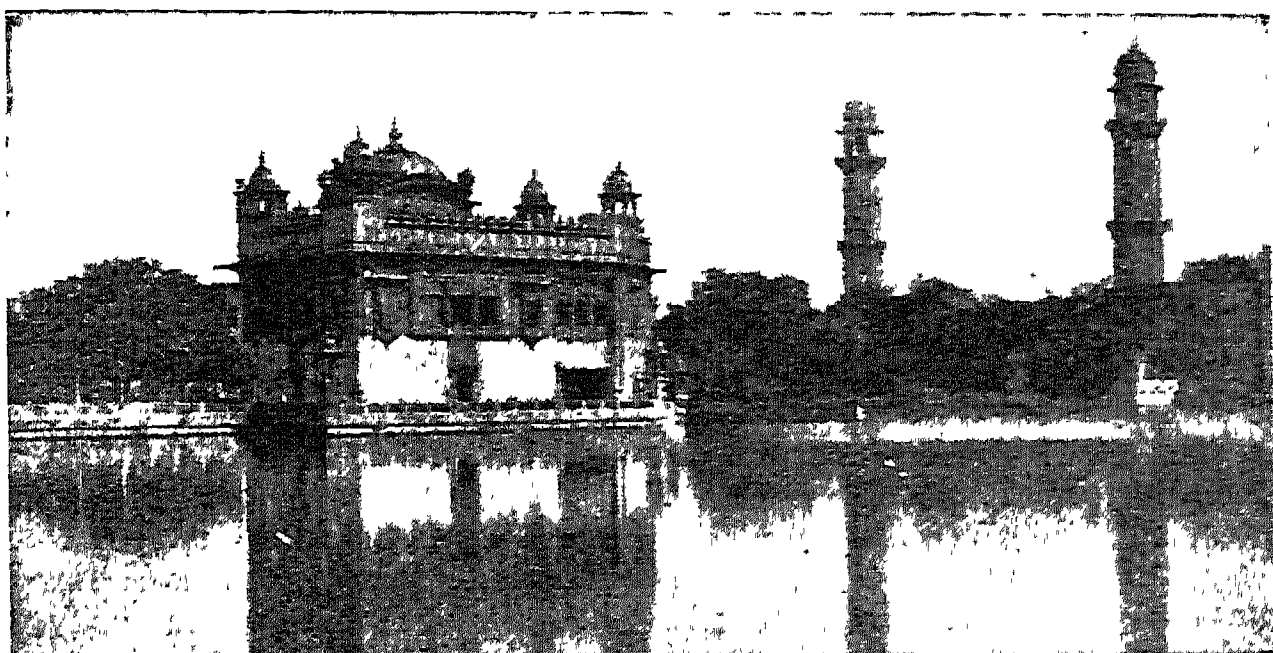
by means of tourniquets and similar devices.

The dangers following amputation are shock, secondary haemorrhage, and septic infection. Shock can be reduced to a minimum by skilful administration of the anaesthetic, blood transfusion, injection of saline solutions, and administration of stimulants. Secondary haemorrhage is a fresh bleeding from the vessels, occurring a few hours or days after the operation has been completed, a serious condition almost always due to septic infection of the wound, though now rare because antiseptic methods have reached so high a degree of excellence.

As regards special amputations, the removal of a finger is frequently required after machine accidents, and is attended with little risk; amputations of the forearm are relatively simple and usually satisfactory; disarticulation at the shoulder joint is a more serious operation. Amputations of the toes, foot, and lower part of the leg are generally unattended by complications, but amputation through the thigh is a severe operation, and disarticulation at the hip-joint is always one of great gravity. Amputation of the breast is an operation frequently performed for cancer, and when the disease is limited is not seriously dangerous; extension of the disease, however, to the arm and other parts may necessitate an operation of considerable magnitude and difficulty. Amputation of the uterus (womb), or part of that organ, also most often performed for cancer, has resulted very satisfactorily. See Artificial Limbs.

**Amraoti** OR AMRAVATI. A town in Berar, Madhya Union, India. The capital of Amraoti district, it is 6 m. N.N.E. of Badnera railway junction. It is situated in the valley of the Purna, a tributary of the Tapti, at the end of an extensive alluvial plain. A great market for grain and cotton, it is famous for its temples, that of Bhawani being 1,000 years old. Here also is Sri Shivaji college, affiliated to Nagpur university, and Victoria technical institute. Pop. (est.) 85,000. Amraoti district, area 4,733 sq. m., est. pop. 1,010,000, contains numerous steam factories for the ginning and pressing of cotton, as well as many cotton mills.

**Amrāvati** OR AMARĀVATI. Ruined Indian city, in Kistna district, Andhra, near Dharanikota, on the right bank of the



Amritsar, India. Religious centre of the Sikhs. The Golden Temple standing by the Pool of Immortality

Kistna, 20 m. N.W. of Guntur. One of the centres of the Buddhist kingdom of Vengi, its stupa (monument) is famous. The carvings, illustrating the life of Buddha, are preserved in the British and Madras museums.

**Amreli.** Dist. and town of Bombay state, India. In Kathiawar peninsula, a few miles N. of the Satrunji river, the town is a cotton-trade centre. Pop. (1951) dist., 317,203; town, 28,826.

**Amritsar.** City of India, in the state of Punjab, capital of a dist. of the same name. The city is 32 m. E. of Lahore by rly., and is the religious centre of the Sikhs, and the site of the Golden Temple, or Darbar Sahib, with its tank or Pool of Immortality, which gives the town its name, and a copper dome covered with gold foil. Amritsar is a rail and road junction, and has a large textile industry in cotton, wool, and silk. It is a major commercial and manufacturing centre for sugar, oilseeds, tanning, milling, and craft goods. There are a medical college and two arts colleges affiliated to Punjab university. Pop. (1951) dist., 1,367,040; city, 325,747.

On April 13, 1919, occurred the famous "Amritsar massacre," when troops under the command of General Dyer (see Dyer, R. E. H.) fired on a large gathering of persons, most of whom were unarmed; 379 persons were killed and 1,200 injured.

The district (area 1,942 sq. m.) and city were also the scene of much violence and bloodshed following the partition period of 1947, when they were included in the Indian state of Punjab. Almost the whole of the Muslim population (about 50 p.c.) fled into W. Punjab (Pakistan) and there was a large incursion of Sikh refugees from W. Punjab. The prosperity of the city suffered for some time after.

**Amrom** OR AMRUM. One of the North Frisian Islands. Off the W. coast of Schleswig-Holstein, Germany, it is about 10 sq. m. in area, and at low water is linked with the island of Föhr to the N.E. To the N. of Amrom lies Sylt.

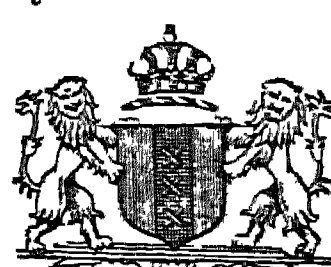
**Amru-el-Kais.** Author of the first of the Mo'allakat or collections of the best poems of certain writers. He flourished in the 6th century A.D. and was regarded by Mahomet as the most distinguished of Arabian pre-Islamic poets. Sir William Jones included Amru-el-Kais's poems in the translation of the seven Mo'allakat which he brought out in 1783. The word Mo'allakat means exalted.

**Amshaspands.** Six immortal holy ones of Persian mythology. They are attendants upon Ormuzd.

**Amstel.** River of the Netherlands. Formed by the union of the Dreht and the Mydreht, it flows to the Yssel Meer, through Amsterdam. It is about 10 m. long.

**Amstelian.** In geology, a division of the Pliocene system as occurring in the Netherlands.

**Amsterdam** (Latin *Ametelodamum*; formerly Amstelredam, dyke of the Amstel). Constitutionally the capital



Amsterdam arms

(though not the seat of government). commercial capital, largest city, and a seaport of the Netherlands; area 24 sq. m. In the prov. of N. Holland, it is on the Amstel river, where it joins the IJ or Y, an inlet of the Yssel Meer.

A fishing village before 1200, Amsterdam was a town with many privileges when William the Silent united the provinces in 1581. It benefited by the commercial ruin of Antwerp in the second half of the 16th century, and it was constantly vitalised by refugees, who





Amsterdam. Plan of the central part of the Dutch commercial capital, termed "Venice of the North." It is one of the principal seaports of the Netherlands

were natives of Amsterdam, and Spinoza was born (1632) in its Jewish quarter, where Rembrandt lived for over twenty years. Pop. (1947) 803,847, increased by 1955 to (est.) 860,000.

During the Second Great War less immediate damage was sustained by Amsterdam than by other cities of the Netherlands. But on the day of the German invasion, May 10, 1940, the city was heavily raided by German bombers, and Amsterdam was occupied by the Germans on May 15. After that date the R.A.F. repeatedly bombed the harbour and oil tanks. In Feb., 1941, following riots which broke out in sympathy with the persecuted Jewish citizens, the Germans imposed upon the city fines amounting to £1,000,000. Deportations of workers to Germany made a steady drain on the population throughout the years of occupation. The Jewish population, 80,000 in 1940, had declined to 8,000 by 1945.

In the final months of the war in Europe the city, in common with the rest of the western Netherlands, suffered from lack of food. Starvation led to a sharp rise in the death rate (19,735 Jan.-June, 1945; 3,655 Jan.-June, 1939). Relief came only in May, 1945.

**Amsterdam** OR NEW AMSTERDAM. Island in the Indian Ocean. Lying almost equidistant from S.

Africa and Tasmania, it is an extinct volcano, 2,980 ft. above sea level, with an area of about 25 sq. m. Discovered by Van Diemen in 1663, and acquired by France in 1893, the island is barren and uninhabited.

**Amu-Daria.** River of central Asia. Its headstreams, the Panja and the Vaksh (called also Surkhab and Kizil Su in its upper reaches), rise in the Pamir plateau. During its course of about 1,500 m. it forms part of the boundary between Afghanistan and Tadzhik and Uzbek S.S.R.s, thence flows N.W. to enter the Aral Sea by two main branches through a wide delta. It is important for irrigation. It is the ancient Oxus and the Persian Jihun.

**Amulet.** Object worn as a charm against evil. Researches in Babylonia, Assyria, and Egypt have brought to light a vast number of specimens, of which the scarabaeus and the eye of Isis are familiar examples. It has been suggested that phylacteries, containing extracts from the Law of Moses, were worn by the Hebrews not only as tokens of piety, but also as amulets. Mahomedans wear small cases containing extracts from the Koran. In Italy the peasants very commonly wear little figures of animals, or a closed hand with extended index and little finger representing the sacred

horns, as charms against the Evil Eye. In Great Britain flint arrowheads and small pebbles with holes in them served a similar purpose. While the superstitious use of the amulet was condemned by the Church in the 8th century, the wearing of Christian symbols as amulets has always been common. See Evil Eye.

**Amulree, WILLIAM WARREN-DER MACKENZIE, 1ST BARON** (1860-1942). British judge and labour mediator. Born August 19, 1860, near Perth, he was educated at Edinburgh university, and University College, London, and was called to the bar in 1886. He was president of the Industrial Court, 1919-1926, and successfully conducted a number of inquiries into industrial matters and arbitrations of trade disputes. He was chairman of the Royal Commissions on licensing laws and Newfoundland. In 1929 he was raised to the peerage, and in the following year became secretary of state for air in the 2nd Labour govt. He died at Winterbourne Stoke, Wilts, May 5, 1942.

**Amundsen, ROALD** (1872-1928). Norwegian explorer. Born at Borje, July 16, 1872, the son of a shipowner, Amundsen, after studying medicine, went to sea. About 1901 he joined an exploring expedition into the Arctic seas. In 1903-05 he led a party through the North-West Passage, and in 1910 set out in the Fram for the northern seas, but changed his mind and sailed for the Antarctic. He remained there for over a year, and on Dec. 16, 1911, reached the South Pole, the first man to do so, 33 days ahead of Scott's party. After his return he wrote a book, *The South Pole*, 1912, and lectured on his travels. In 1918 he started on a North Polar expedition, reaching Nome, Alaska, in July, 1920. He crossed the North Pole from Spitzbergen to Alaska in an Italian-built airship piloted by



Roald Amundsen, Norwegian explorer

Gen. Nobile, May, 1926. On June 18, 1928, he left Tromsø, Norway, in a sea-plane, to search for traces of the missing Gen. Nobile and his Arctic expedition. Months later bits of floating wreckage from his plane gave evidence of his tragic end. Consult Lives, C. Turley, 1935; B. Partridge, 1953.

**Anabaptists** (Gr. *anabaptizein*, to baptize again). Title of a fanatical Protestant sect that arose at Zwickau under the leadership of Thomas M  nzer in 1521. The name, taken from one of their doctrines which rejected infant baptism and required rebaptism in later life, has been applied to other sects holding this tenet, and throughout the 16th century was used indiscriminately for all Protestants whose doctrines appeared to be subversive of ecclesiastical and political order.

The original Anabaptists held that the existing order ought to be destroyed and a new divine order substituted, which should do away with all inequalities and private property, ideas which developed into a negation of all moral laws. M  nzer's doctrines helped to bring about the Peasants' War in Germany, 1522-25. He himself was put to death, but the Anabaptists were not suppressed. In 1534, led by John of Leyden, they took forcible possession of the town of M  nster. John asserted that he was a king, the successor of David, and that his actions were dictated by heavenly visions. Polygamy and other excesses were practised. In 1535 the town was recaptured by the German prince-bishop and John and his chief followers were executed. As an actual sect the Anabaptists disappeared. See

Rise and Fall of the Anabaptists, E. B. Bax, 1903.

**Anabasis** (Gr., going up). Historical work by the Greek general and writer Xenophon. In 401 B.C. Cyrus the younger collected a force at Sardis in Asia Minor to attack his elder brother Artaxerxes, king of Persia. The backbone of this force consisted of some 10,000 Greek mercenaries under Clearchus, with whom Xenophon served as a volunteer. The force reached the interior, and gained a victory in the battle of Cunaxa, in which, however, Cyrus was killed. The Greek generals having been treacherously murdered by the Persians, the command devolved upon Xenophon. In a masterly retreat, famous as the Retreat of the Ten Thousand, he led his fellow countrymen through difficult and often hostile country back safely to the coast after a journey of five months. The sea was reached at Trapezus, the modern Trabzon. The style of Xenophon's narrative is conspicuous for its simplicity and directness. Anabasis is also the title of Arrian's account of the campaigns of Alexander the Great.

**Anableps.** Small fresh-water fish of the family of Cyprinodontids, found in Central and S. America, and remarkable for the structure of the eye which enables it to see both above and below the water. It swims on the surface, and the

eyes, which project strongly, are each horizontally divided by a band or partition into two parts for vision in the air and the water respectively. Hence its popular name of *cuatro ojos* or the four-eyed fish.

**Anabolism.** The chemical and physical processes involved in building up simple substances into complex ones by a living organism. The primary anabolic processes in plants are the synthesis of proteins, carbohydrates, and fats from inorganic substances. In animals, anabolism is responsible for the growth and maintenance of cells and tissues.

**Anachronism** (Gr. *ana*, back; *chronos*, time). Assignment of events or things or persons to a period earlier or later than that to which they actually belong. Literature abounds in examples of such mistakes in fact, especially in historical drama and fiction, owing to imperfect acquaintance with the more or less remote period dealt with or to mere carelessness.

Where the work is poetical and not primarily intended to give an historically exact picture of a period, mistakes of this kind are relatively unimportant. A far more serious mistake is made by those who insist upon strict accuracy in fact as a cardinal principle, but yet attribute to a period a style of language and a mode of thought which belong to their own time.



**Anabasis.** Map showing the march, generally called the Anabasis, of the Ten Thousand Greeks under Cyrus the younger, 401 B.C., from Sardis to Cunaxa, and the return, known as the Catabasis, to Trapezus, with the route thence to Pergamus, as described by Xenophon, who led the retreat



## ANAESTHESIA: ITS ORIGIN AND USES

K. M. Woodruff, M.B., M.R.C.S

*The history of the use of anaesthetics in surgery and particulars of the various drugs employed in producing a state of anaesthesia, general or local, are here reviewed. Consult also articles on Chloroform; Cocaine; Ether; Laughing Gas; Surgery, etc.*

Anaesthesia (Greek, *an-*, not; *aisthēsis*, feeling) is the term used to describe a loss of feeling or sensation in the whole or part of the body. Anaesthesia may result from injury to, or disease of, the brain or nerves, but is generally understood to mean the condition produced artificially by means of certain drugs which are known as anaesthetics.

**HISTORY.** From the earliest times man has sought to assuage grief and pain by dulling consciousness. The different methods first employed were the inhalation of fumes from different substances, swallowing or injection of various drugs such as poppy or hyoscyamus or alcohol, or pressure applied to important nerves and blood vessels, or hypnotism. Homer in the *Odyssey* says: "Helen dropped into the wine a drug, an antidote of grief and pain to lull all sorrow and induce oblivion to all ills." Herodotus (c. 484-425 B.C.) told of the custom of inhaling the fumes of hemp (*Cannabis indica*) to produce intoxication. In the second century A.D. the physician Galen wrote of the power of mandragora to paralyse sensation and motion; and later, Lucian, the Greek writer, referred to the narcotic effects of mandragora. The Chinese were the first to use Indian hemp (hashish) to dull consciousness of pain.

The use of anaesthetics in the modern sense started in the middle of the 19th century. In 1772 Joseph Priestley (*q.v.*) discovered nitrous oxide, and in 1800 Sir Humphry Davy suggested the use of the gas as an anaesthetic; but it was not until 1820 that Henry Hill Hickman, a young physician, began to experiment on animals by causing them to inhale carbon dioxide and, later, nitrous oxide gas. The discovery of anaesthesia proper belongs to four American investigators: Crawford W. Long (1815-78), of Athens, Georgia; W. T. G. Morton (1819-68), of Boston; Horace Wells (1815-48), of Hartford; and Charles T. Jackson (1805-80), of Boston. In 1842 Crawford Long performed the first painless operation under ether for a tumour of the neck, but did not publish the results. In 1844 Horace Wells had a tooth extracted under nitrous oxide

and he used this gas upon his patients with such good effect that he gave a demonstration at the Harvard University medical school. The exhibition, however, was a failure, and so disheartened him that he later committed suicide.

In 1846 W. T. G. Morton, a student under Wells, was familiar with the use of nitrous oxide, and while serving as a medical student under Charles Jackson, a chemist, was induced by the latter to use ether instead of nitrous oxide. Morton did so, and gave a successful demonstration at the Massachusetts general hospital. The method was brought to Great Britain the same year, the first operation under ether anaesthesia being carried out at University College Hospital, London, by Robert Liston.

Chloroform, which largely replaced ether for a time in Great Britain, was introduced by Sir James Young Simpson, an Edinburgh obstetrician, on the recommendation of Waldie, a chemist of Liverpool, as an inhalation for the relief of childbirth pains.

**LOCAL ANAESTHETICS.** The drugs are applied to, or injected into, or around the part to be operated upon. Extensive areas of the body can be anaesthetised in this manner, consciousness being retained throughout. In 1867 Sir B. W. Richardson introduced the ether spray with the object of freezing the affected part. Of greater importance was the introduction in 1884, by Karl Koller of Vienna, of the first local anaesthetic, cocaine, an alkaloid occurring in the leaves of *Erythroxylon coca*, a shrub native to South America. More recently, however, other less toxic drugs have been introduced, such as procaine, novocaine, nupercaine, amethocaine, eucaine, and stovaine, as well as other combinations such as quinine and urea.

Various techniques are employed for the administration of local anaesthetics, *e.g.* surface anaesthesia, in which the drug is applied to a mucous surface such as that of the eye, nose, throat, and genital organs; infiltration anaesthesia, which aims at paralysing the nerve endings at the site of operation; and regional anaesthesia, in which the nerve trunk

supplying the sensory nerves in the area to be operated upon is affected by creating a block in the path of these nerves at a point remote from the field of operation. A more extensive type of block called spinal anaesthesia consists in the production of anaesthesia in the lower extremities and in the lower part of the body below the diaphragm by the injection into the sub-arachnoid space of the spinal cord of a drug which paralyses the spinal nerves as they enter and leave the spinal cord. This was first attempted in 1896 by August Bier, a Greifswald surgeon, but it was not brought into general use until 1906. The main disadvantage of spinal anaesthesia is that it may cause a severe fall in blood pressure. Freezing of small areas of skin with ethyl chloride spray is in common use, and larger areas, such as the limbs, can be rendered analgesic by refrigeration, in which crushed ice is packed round the limb.

**BEFORE OPERATING.** Drugs given to patients before operations have two main actions. They diminish the flow of mucus and saliva resulting from the use of some general anaesthetics, and they produce drowsiness thus allaying anxiety. The drugs most commonly employed are morphine, atropine, and scopolamine (hyoscyne), given about an hour before operation. (Scopolamine and morphine are the active agents in "twilight sleep" formerly used for obstetrical analgesia.)

**BASAL ANAESTHESIA.** It is now almost a universal practice to produce general anaesthesia by the combined action of a non-volatile narcotic with a volatile or gaseous anaesthetic. The former drug, termed a basal narcotic, is used to render the patient unconscious before the administration of the anaesthetic. The advantages of this method include absence of apprehension by the patient and a decrease in unpleasant after-effects, such as nausea and vomiting. Paraldehyde, introduced in 1884, is used chiefly with children. It is administered in a 10 p.c. solution in water and run slowly into the rectum at blood heat.

Avertin (tribromethyl alcohol), first used in 1926, is given in the same manner, the strength of the solution being 2½ p.c. Other basal narcotics include pernocton, amy-tal, nembutal, evipan, and pentothal (the last being most frequently used), and are usually given intravenously.

**Anahuac.** Name by which the great central plateau of Mexico is known, formerly applied to the ancient kingdom of Mexico. The region extends between the Rio Grande in the N. and the isthmus of Tehuantepec in the S., and was extensively covered by lakes, hence its name, meaning amid the waters.

**Anaitis.** Iranian goddess, sometimes called the Persian Artemis. The name is the Greek form of the Persian Anahita. The goddess of fertilising waters, she passed into Mazdeism, and was described in the Avesta. She was invoked in aid of marriage and childbirth, and the Persian Artaxerxes Ochus erected images of her throughout his empire. Her cult spread to Armenia and Asia Minor.

**Anakapalle.** Town of Andhra, India. It is 18 m. S.W. of Vizagapatam, on the rly. to Rajahmundry, trades in agricultural products, and exports sugar, cotton, etc. Pop. (1951) 40,102.

**Anakie.** Mining village in Springsure district, Queensland, Australia, 193 m. W. of Rockhampton, on the rly. to Longreach. The population (c. 100) is interested in the mining and cutting of sapphires and the mining of corundum, valued as an abrasive.

**Analcime** OR ANALCITE (Greek *an-*, not; *alkē*, strength). Hydrous metasilicate of sodium and aluminium. It usually occurs in well-formed colourless or white crystals of regular growth belonging to the cubic system. It is commonly a secondary mineral, a member of the zeolite group, and occurs filling amygdaloidal cavities in basalt lavas. It is the latest product of consolidation in certain basalts and in the monchiquites.

**Analogue Machine.** Mathematical machine which digests a problem, operates on it, and produces the solution in the form of curves or graphs; in particular, the differential analyser, which produces the solution of a differential equation as a graph of the integral curve (see Calculus). An analogue machine is to be contrasted with a digital computing machine, in which the mathematical problem, before being presented to the machine, must be interpreted as a problem about ordinary numbers.

**Analogy** (Gr. *ana*, up to; *logos*, proportion). A certain similarity in things in other respects unlike. In language, it creates forms and even alters whole words after the model of others already familiar. Biological analogy is resemblance in function, not in form. In logic,

it is a process of reasoning in which it is assumed that if two or more things possess similar essential, non-contingent attributes, their other attributes will probably be similar. This method of reasoning is an incomplete induction, and its degree of certainty will vary with the number and importance of the similar attributes.

In theology, the argument from analogy is mainly of use for apologetic or evidential purposes. Proof of the existence of God, or of the truth of any particular religious doctrine or system of doctrines, cannot be demonstrated mathematically. The most that can be reached is a degree of probability that amounts to a moral certainty, and not only justifies but reasonably demands acceptance of a doctrine or compliance with a precept.

In the department of nature, where we have the evidence of sight and of the other senses, what we are in the habit of regarding as certainties often only amount to overwhelming probabilities. The world has seen the sun rise every morning throughout its history, and it is convinced that it will rise again to-morrow morning as usual. Such a conviction is justified by experience, but it does not amount to absolute certainty.

So in the realm of spiritual things, where the direct evidences of the senses are not available, where experience is less than universal and uniform, and where we deal with matters which belong to a plane only partly within our knowledge, it is vain to seek demonstrative proof. We can only find such a degree of probability as will exclude reasonable doubt, and afford a sufficient ground for belief and practice; and in the establishment of such a degree of probability, analogy plays a large and important part.

**Analogy of Religion, THE.** A treatise on the philosophy of religion, by Joseph Butler, bishop of Durham. It was published in 1736 with the title of *The Analogy of Religion, both Natural and Revealed, to the Constitution and Course of Nature*. It was based on the statement of Origen: "He who believes the Scriptures to have proceeded from Him who is the author of Nature may well expect to find the same difficulties in it as are found in the constitution of Nature." A whole literature of exposition and comment has grown up around *The Analogy of Religion*. See Butler, Joseph; consult also *Studies Subsidiary to the Works of Bishop Butler*, W. E. Gladstone, 1896.

**Analysis** (Gr., decomposition). Separation of any whole into the parts of which it consists. Its correlative is synthesis (putting together), without which it is incomplete. Thus, to obtain the true conception of a tree, it is necessary to consider separately its trunk, branches, leaves, etc., and then to put them together to form a whole. Grammatical analysis is the formal splitting of a sentence into its functional components, i.e. subject, predicate, object, etc.

**Analysis.** In chemistry, term implying the determination of the composition of a substance, or the quantity of extraneous matter present. If only the elements present are identified, the analysis is said to be qualitative, but if the quantities are determined, the process is termed quantitative. In the case of quantitative analysis, this is either gravimetric or volumetric, according as the components are weighed or measured.

Analysis is applied to a great variety of substances, but it is well to recognize that many important vegetable compounds are not amenable to accurate chemical analysis. Students are taught to analyse mixtures of chemicals by observing the physical characters of the compound and carrying out in a definite order a series of tests. In the case of the analysis of food, the analyst applies tests to ascertain whether it conforms to certain well-defined characteristics which experience has taught to be those of a pure article. See Chemistry.

**Analysis.** In mathematics, term employed to denote the process by which a problem is reduced to its simplest elements. It is more specifically applied to those branches of mathematics which investigate the relations of variable or indeterminate quantities by means of symbols. Thus analytical geometry investigates the character of lines, curves, and surfaces, by the employment of algebraic symbols. The process is carried farther in some branches of the infinitesimal calculus. Harmonic analysis is a mathematical method by which irregular agglomerations of quantities can be reduced to forms in which they show themselves amenable to grouping. Thus harmonic analysis applied to a vast number of statistics, such as statistics of rainfall, is used in attempts to discover a law governing the figures.

**Analysis.** In music, term used for the species of study concerned with the details of the construction of a composition. Such are its phrase building, its



8,000 ft. high and contain Anaimudi (elephant forehead), 8,850 ft., the highest peak in S. India. An important station in the forest service, Mount Stuart, is situated in the midst of a dense bamboo jungle. Elephant, bison, and ibex abound; on the hills teak, tea, and coffee are grown, on the lower slopes rubber, especially in the S. Hydro-electric power is being developed.

**Ananda Mahidol** (1825-46). King of Siam. Born Sept. 20, 1925, he ascended the throne on March 2, 1935, while at school at Lausanne, Switzerland, where he returned after his coronation in 1938. A council of regency governed in his name. On June 9, 1946, he was found dead in his Bangkok palace. A commission appointed to inquire into his death decided in 1954 that he was murdered by his secretary and two pages, all three of whom were condemned to death.

**Ananias.** Name of three persons mentioned in the Acts of the Apostles. (1) A convert who made a false declaration concerning the sale of a piece of land for the church; he and his wife Sapphira fell dead before the rebuke of Peter (Acts 5). His name has become synonymous with liar. (2) A disciple at Damascus to whom Christ appeared in a vision and directed him to baptize Saul of Tarsus (Acts 9 and 22). (3) The Jewish high priest who was one of Paul's accusers before Felix (Acts 23-24).

**Anapaest** (Greek *ana*, back; *paiein*, to strike). In prosody, a trisyllabic foot consisting of a long, or accented, syllable preceded by two short, or unaccented, syllables. It is so called because it is a dactyl reversed. Although the English language contains few words that are anapaests—domineer is an example—anapaestic verse, especially the anapaestic tetrameter, has established itself firmly in English literature. A famous example is Byron's "The Assyrian came down like a wolf on the fold." Swinburne uses anapaestic rhythms with effect. They are also much used in humorous verse, e.g. in limericks:

There was a young man who said  
"Damn!"

It occurs to me now that I am  
Just a being that moves in pre-  
destinate grooves;

I'm not even a bus, I'm a tram."

**Anaphora** (Gk., offering). The most important part of the liturgies of the Eastern Church, roughly corresponding to the Canon of the Western liturgies. It consisted of four main divisions: the Salutation (Lift up your hearts, etc.),

the great Eucharistic prayer, the Communion, and the Thanksgiving.

**Anaphylaxis** (Gr. *ana*, back; *phylassein*, to guard). Medical term for a form of allergy, namely a condition of exaggerated susceptibility, or sensitisation, to the action of an injected (albuminous) substance following a first injection of the same substance. The effect has been observed following antitoxin injections, including blood serum. If the injections are given daily or weekly no sensitisation occurs, but injections at intervals of not less than 12 to 14 days may result in anaphylactic shock, sometimes a dangerous condition. It can be prevented by desensitising the patient through the injection of a small dose of serum subcutaneously some hours before the antitoxin serum. Anaphylaxis is thought to be due to the reaction of a protein foreign to the human organism.

**Anarchism** (Gr. *an-*, not; *archē*, rule). Opposition to all law and order as enforced by a government. In its original sense the Greek word *anarkhia* (anarchy) meant no government whatever, and it is so used today; but anarchism is held by its more intelligent advocates to be a system of voluntary government not relying on the sanctions of the state. It is rather a movement directed towards destroying the tyranny of the state and giving fuller play to natural economic forces and the principle of mutual aid. This, it is thought, would produce a state of society in which social order would rest not on repression, but on good will. It is claimed by many that emphasis on ethical training of the young would lead to the disappearance of government, and the establishment of a peaceful anarchic society. This line of thought owes much to the French thinker Proudhon and the Russian Bakunin, and was developed by Prince Kropotkin. Anarchism, like socialism, holds that land and capital are to pass from private ownership. History gives no support to the theory of anarchism, except possibly for a small community. Although the philosophy of anarchism is not concerned with violence, its supporters often advocate forcible methods and propaganda by deed.

Before the First Great War anarchist societies were common in Europe, especially in Russia and Spain, and also in the U.S.A., while the trade unions of Italy and France were anarchist rather than

socialist. After that war, up to and during the Spanish Civil War of 1936-39, the anarchist organization in Catalonia, the Federación Anarquista Ibera, was a power in Spanish political life. Small anarchist groups existed in England in the 1880s. Consult *Anarchy*, P. A. Kropotkin, Eng. trans. 1897.

**Anaspida.** Group of extinct, fish-like vertebrates which died out some 300 million years ago. See *Agnatha*.

**Anastasius.** Name of four popes. Anastasius I, pope 398-401, is chiefly remembered for his condemnation of certain points in the teaching of Origen. He is regarded as a saint; his feast is kept on April 27. Anastasius II, pope 496-498, sought in vain to reconcile the Eastern and Western churches. Anastasius III, 911-913, and Anastasius IV, 1153-54, were undistinguished.

**Anastasius I** (c. 430-518). East Roman Emperor. Born at Dyrachium of humble parentage, he became a palace usher and in 491 succeeded Zeno, whose widow Ariadne he married, as emperor changing his name from Silentiarius to Anastasius. He ruled with conspicuous success. In 493 he defeated Zeno's brother Longinus at Cotyaeum (Kutaya), and in 506, after a three years' war, made peace with Persia. In 512 he built the long wall, called after him the Anastasian wall, to protect Constantinople.

**Anastasius II** (d. 721). East Roman Emperor, originally named Artemius. He was secretary to the Emperor Philippicus Bardanes, whom he succeeded in 713. A mutiny at Rhodes in 716 resulted in his deposition in favour of a tax-gatherer, Theodosius, who was succeeded by Anastasius's former general, Leo the Isaurian. In 721 Anastasius, who had lived for five years as a monk at Thessalonica, besieged Constantinople, but was captured by Leo and put to death.

**Anastigmatic Lens** OR ANASTIGMAT. Lens corrected for astigmatism. This is usually unnecessary with telescopes in which light is collected only over a small angle, but is desirable with photographic lenses. Correction for astigmatism may conflict with correction for curvature of field and for achromatism. The anastigmat used in photography is reasonably well corrected for all these aberrations.

**Anastomosis** (Gr. *anastomoō*, to provide with a mouth). In anatomy, the union or communication of blood vessels in the form

Regional anatomy is the study of all the organs and tissues found in given regions of the body. This is the form of anatomy studied in the dissecting-room and required for the operating theatre. Regional anatomy is also closely related to functional anatomy, in which the relationship of structure to function is emphasised; and to radiographic anatomy, in which the skeleton and the hollow organs of the living body are investigated by means of X-rays, the skeleton directly, the hollow organs after filling them with some radio-opaque substance. Applied anatomy deals with the application of structural knowledge to the devising of techniques and the understanding of symptoms and signs in clinical surgery, medicine, and midwifery.

Human anatomy is thus an extensive subject. It is taught in part by lectures and demonstrations, and healthy students or injured patients may be used to illustrate the study of the living body. But the traditional method of studying anatomy is by dissecting a dead body. The students, usually working in pairs and guided by a dissecting manual, have to recognize and display the important structures to be found in a given region, after which they move to another, and so on until they have dissected the whole body. The bodies used are preserved by embalming, and often the arteries are injected with red material to facilitate recognition. The embalming process distorts the natural appearances considerably, so that dissecting-room anatomy is at best only an approximation to living anatomy as seen in the operating theatre. Most anatomy departments maintain a museum of specially prepared specimens, and also a supply of dissected "parts" which can be inspected and handled by those who wish to refresh their memory.

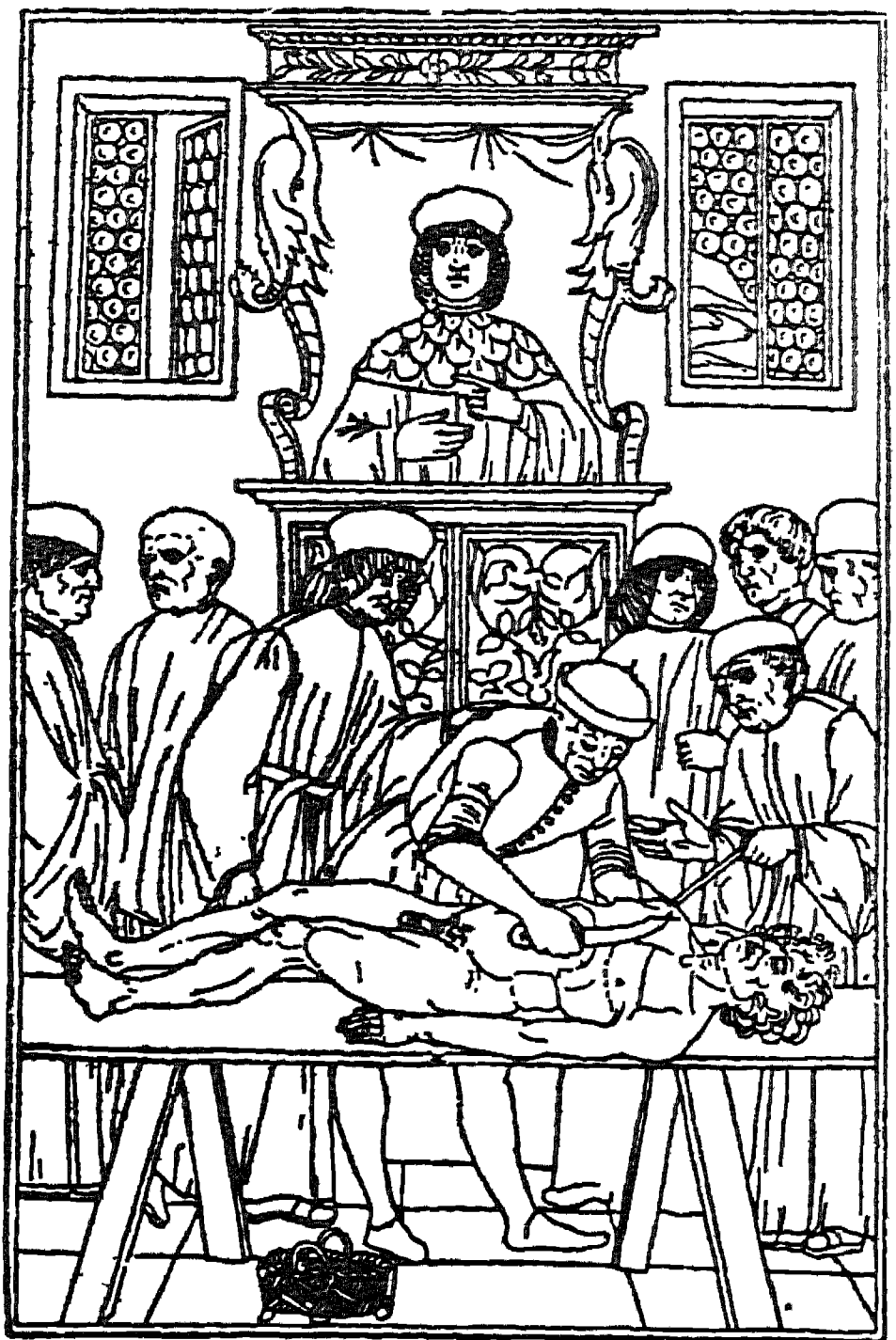
The nomenclature of human anatomy forms a descriptive framework to the terminologies of all other medical subjects, and it is thus important that it should be acceptable to those who profess these subjects, and also to those who work in closely related disciplines, such as comparative anatomy, palaeontology, veterinary anatomy, experimental embryology, and so on; and efforts have been made to establish a unified international terminology based on Latin.

Anatomy is defined as the study of structure, and physiology as the

study of function, but the two are interdependent, and anatomists find it necessary to explain the complexities of structure by reference to function, while physiologists frequently discuss function in terms of structure. Indeed, in some British medical schools microscopic anatomy is taught in the physiology rather than in the anatomy department. Anatomy is also intimately related to the branches of pathology called morbid anatomy and morbid histology, which deal respectively with the gross and microscopic changes in tissues affected by disease.

As an educational discipline anatomy trains the memory, the powers of observation and description, and the faculty of using facts to produce a connected, logical, and orderly statement. Many of the anatomical details will subsequently be forgotten unless the student takes up a branch of his profession—for example, surgery—where they are of paramount importance. Nevertheless, anatomy retains its basic position in medical education, for until normal structure is appreciated neither normal function nor the changes wrought by disease can be understood.

**COMPARATIVE ANATOMY.** Though strictly speaking comparative anatomy embraces the study of both animals and plants, the term is usually restricted to the science which seeks to discover similarities and differences in the structure of different animals. Comparisons of this kind quickly led to the finding that animals might be classified in groups according to their anatomical characteristics, and so began the science of taxonomy. The study of comparative anatomy showed obvious affinities between certain groups of animals and gradually generated the concept that one type of animal might,



Anatomy. Dissection in the Middle Ages: the professor occupies his "chair," the lay demonstrator dissects: after the frontispiece of a book published in 1493

given sufficient time, evolve into another. This idea was becoming current in the early part of the 19th century, but it required the genius of Charles Darwin to suggest that "natural selection" was the basic mechanism by which this evolution occurred. His book, *The Origin of Species*, published in 1859, marked the beginning of a new method of biological thought, and his views raised a bitter controversy between scientific and religious opponents over the place of man in nature.

It is a measure of the eventual success and wide dissemination of Darwin's explanation that man is nowadays accepted with comparatively little question as a collateral descendant of the same stock which gave rise to the group of animals called the Primates. The study of this group, including man himself, is nowadays termed physical anthropology, and a large part of the interest of physical anthropologists is devoted to a comparison of the structural features of the different groups of mankind. By this means the relationships of different peoples can sometimes be inferred, and some information obtained about their movements in the days before



In a very elementary form, Anaxagoras put forward the earliest atomic theory of nature. His speculation brought Anaxagoras into conflict with the forces of orthodoxy at Athens. His suggestion that the sun and moon were not divinities, but merely fiery lumps, was condemned as atheistic, and he was forced to leave the city. He died at Lampascus in Asia Minor.

**Anaximander** (c. 611–547 B.C.). Greek philosopher. Born at Miletus in Asia Minor, he was the friend of Thales and lived for many years at the court of Polycrates of Samos. He held that all the material substances which make the universe are derived from one element—which he called *apeiron*, or indeterminate matter—which contained and governed all things, being itself immortal and imperishable. He is also credited with various inventions, e.g. a sundial.

**Anaximenes** (fl. 560 B.C.). Greek philosopher. Born at Miletus in Asia Minor, and probably a pupil of Anaximander, he held that all the substances of which the material universe is composed are derived from one natural element, air, as the result of its rarefaction and condensation.

**Ancash.** Coastal department of Peru. It is S. of Libertad and N. of Lima and extends E. to the Marañon river. Mainly mountainous, it is rich in minerals, including gold, silver, copper, lead, tin, antimony, iron, and coal, and grows cereals in its irrigated valleys. The capital is Huaraz. Area, 14,700 sq. m. Pop. (est.) 540,000.

**Ancestor Worship.** Expression in ritual of reverence for departed ancestors, parental or remote. It should be distinguished from the general cult or tendance of the dead, which is a widespread concomitant of animism. This cruder cult, traceable to prehistoric Europe, has profoundly affected the methods adopted by mankind for the disposal of the dead. It was designed to keep the ghost away, and much so-called ancestor worship is no more than this, involving no idea of propitiation. Cooked rice and coconut milk are offered by the Veddas to the spirits of the recently deceased; in the Solomon Islands miniature huts are built for ancestral skulls.

Ancestor-worship is widespread in Africa. The Ibo make offerings to their forefathers on the birth of a child, in whom they think an ancestor is reincarnated. The

Dinkas attribute sickness to the wrath of a slighted ancestor, and placate him with a shrine and offerings. The deification of heroes in early Greek religion may be considered a form of ancestor worship. It persisted as a private worship in imperial Rome by the side of the national polytheism, and was converted, in early Christianity, to devotion to the saints. It was strongly developed in China, where the motive was filial piety.

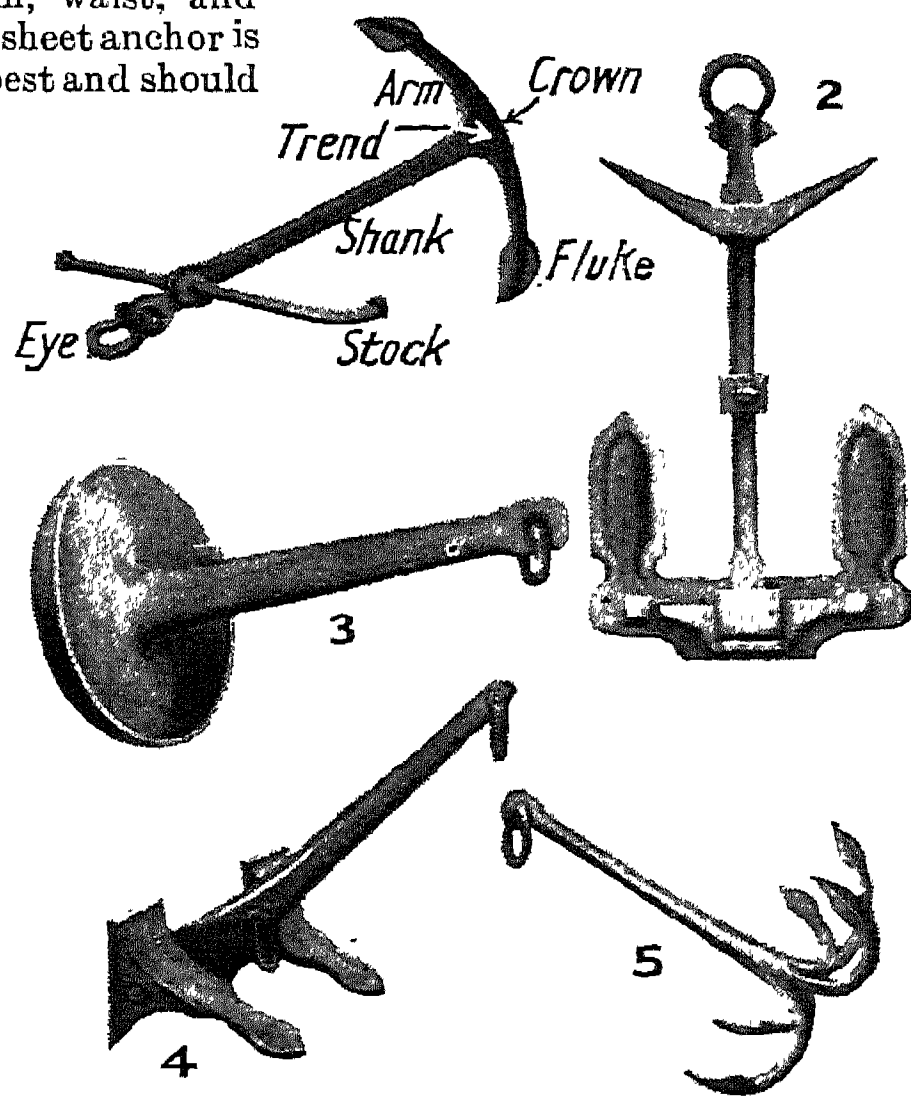
**Anchises.** In Greek legend, ruler of Dardanus, near Troy. By his beauty he attracted the goddess Aphrodite, who became by him the mother of the Trojan hero Aeneas (q.v.). In Virgil's Aeneid Aeneas carries away the aged Anchises on his shoulders after the fall of Troy, and Anchises dies in Sicily.

**Anchor** (Lat. *ancora*, a hook). Iron or steel hook attached to a chain or rope and thrown overboard to hold a ship stationary. A large ship has several anchors—bower, sheet, stream, waist, and spare anchors. The sheet anchor is presumed to be the best and should be used only in emergency. Large ships' anchors are generally stockless. Types of small anchors are the grapnel, which has several flukes and was used in olden times for grappling ships; the kedge, for warping the ship; and the killick, a small emergency anchor. A sea anchor is made of wood and canvas and is dropped over the bow of a hove-to ship to keep its head into the wind. To "shoe the anchor" is to cover its flukes with wood to give better hold in soft ground.

**Anchor Ice.** Ice formed on the bed of a stream. The waters of a stream are mechanically mixed by continual movement, so that when the air temperature is very low (e.g. on cold, clear nights) the whole mass is occasionally reduced to freezing point. In these conditions anchor (or ground) ice would be formed on the bed, where there is less movement than at the surface. The deposition of ice results from the contact of super-cooled water with the rocky bed;

and is heaviest on the upstream side of the rocks where the cooling is generally more intense. Anchor ice usually clings to stones and other loose bodies. It is formed of large crystalline plates and is sometimes more than 5 ft. thick. It is easily distinguished from frazil and from snow blown into the water. When the temperature increases, the ice rises to the surface and floats away, carrying with it the matter frozen into it.

**Anchorite.** A hermit who retires from the world and lives a solitary and ascetic life devoted to religious meditation. This practice developed in the early Christian church when S. Anthony (c. 251–356) retired to the Egyptian desert. Many others settled round him, or withdrew to caves and tombs elsewhere, and this urge for separation led eventually to the development of the monastic orders. Some of the early hermits went to strange extremes, notably the Stylites, who lived, often for



Anchor. 1. Admiralty pattern. 2. Close stowing anchor. 3. Mushroom. 4. Stockless. 5. Grapnel for small boats

many years, on the tops of pillars; the 5th-century S. Simeon was the most notable of these. The R.C. church distinguished four types of anchorites: those who took monastic vows in an order such as the hermits of S. Augustine or the hermits of S. Jerome; those who lived in a community with an officially approved form of life; those unattached to a community but deputed by a bishop to the service of a church or oratory; those with no rule or authority.

**Ancient Demesne** (Lat. *dominium*). Term used in England for land which had long been in possession of the Crown and whose tenants were thus granted certain advantages, mainly in the direction of exemptions from public burdens. Medieval lawyers used it for manors mentioned in Domesday Book as owned by Edward the Confessor or William the Conqueror. It was held that the king could take a tallage, or toll, from his tenants in ancient demesne without consent of parliament, and until 1852 actions about the ownership of such land followed a special procedure. This form of tenure was abolished by the Law of Property Act, 1922.

**Ancient Lights.** English legal term. At common law, if a building had a window which had been there since time immemorial, the owner of the building had the right to an uninterrupted flow of light to that window, and it was called an ancient light. This meant that no adjoining owner might put up anything which would shut out a reasonable flow of light to the window. By the Prescription Act, 1832, a light is ancient if it has been uninterrupted for 20 years.

**Ancient Mariner, THE RIME OF THE.** Poem by S. T. Coleridge. It is founded on a dream told him by a friend. Wordsworth suggested one or two lines which were incorporated in the poem, and it was first published in Wordsworth and Coleridge's joint anonymous volume of *Lyrical Ballads*, 1798. The poem, in which the mariner relates his sufferings and redemption after the wanton killing of an albatross, is masterly as an example of lyrical narrative, and in its powerful suggestion of horror. Many of its lines have passed into familiar speech:

We were the first that ever burst  
Into that silent sea.

As idle as a painted ship  
Upon a painted ocean.

Water, water, everywhere,  
Nor any drop to drink.

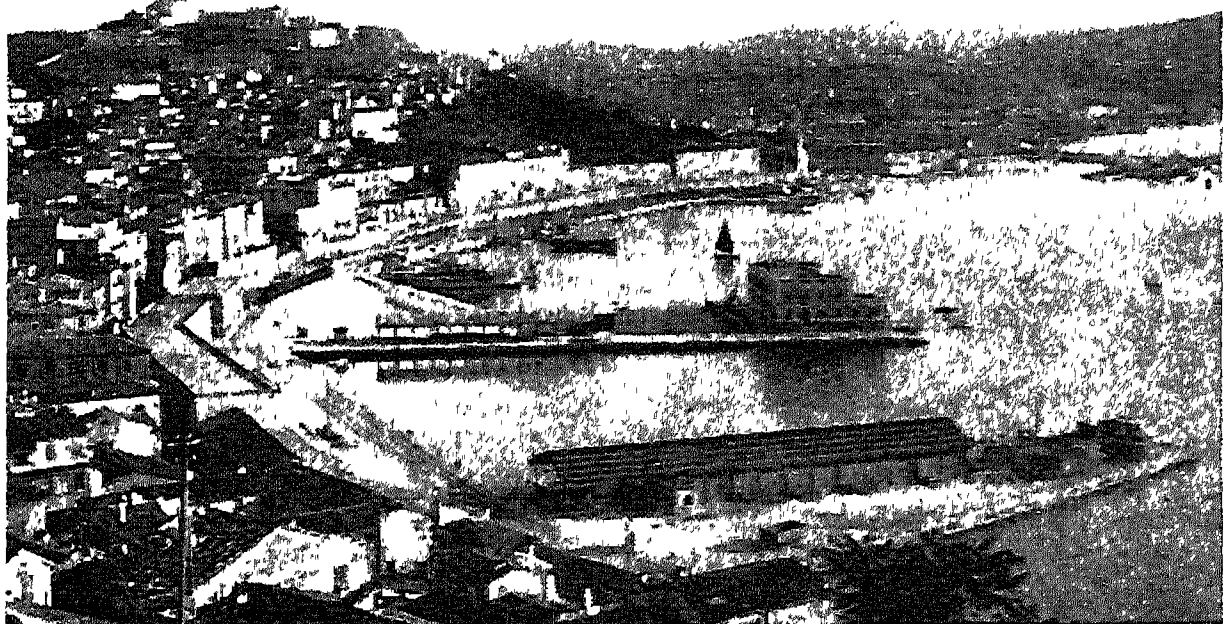
**Ancient Monuments, PROTECTION OF.** British law on this subject is contained in the Ancient Monuments Acts, 1913 and 1931, and the Historic Buildings and Ancient Monuments Act, 1953. The ministry of Works and the local authorities are the authorities concerned. In a schedule to the Ancient Monuments Protection Act, 1882, Stonehenge and 59 other buildings were listed; many others have since been added to the list on account of their historic,

architectural, traditional, artistic, or archaeological interest. A monument need not be above ground. Anyone injuring an ancient monument may be fined. The owner may not, except for urgent necessity, demolish, repair, or alter it without first giving the minister three months' notice. The minister of Works has power, if an ancient monument is in danger from neglect, or threatened demolition or alteration, or other cause, to serve an interim preservation notice which may be followed by a preservation order. Further, if he considers that the monument may, owing to neglect, fall into decay, he may have himself appointed guardian of it. The owner of the monument may in such circumstances be entitled to compensation.

The minister or a local authority may by agreement purchase an ancient monument or accept a gift of it or the guardianship of it, and

**Ancona** (Greek *ankon*, elbow, bend). Seaport and episc. city of Italy. The capital of Ancona province, it stands on the Adriatic, 130 m. direct and 185 m. by rly. N.E. of Rome. The harbour, one of the best in Italy, is protected by two fine piers, one built by Trajan in 115 and bearing a triumphal arch in his honour.

Ancona manufactures soft soap, ship's rigging, leather, and tobacco, and exports goat and lamb skins, hemp, coral, and asphalt. The city was founded about 385 B.C. by Greeks from Syracuse. Later it became a Roman colony, and in 178 B.C. the Romans made it a naval station. Caesar took it on his famous march north; Trajan enlarged it; Goths, Lombards, and Saracens sacked it; and in 1532 it was handed over to Pope Clement VII. It was captured by the Austrians in 1849 and bombarded by them from the sea during the First Great War



Ancona. Adriatic port of Italy, with one of the best harbours in the country. It was originally a Greek colony, founded about 385 B.C.

may then maintain it. The minister has also wide powers to make grants to the National Trust or other persons for the maintenance of a historic building. There is provision for historic buildings councils for England, Scotland, and Wales to advise the minister.

A building of special architectural or historic interest may also be protected by a building preservation order under the Town and Country Planning Act, 1947.

**Ancon** OR PORT ANCON. Coast town of Peru. It is 30 m. by rly. N.W. of Lima. It is less populous than formerly, although it is much visited for bathing. Lord Cochrane, leading the Chilean navy against the Spaniards in Peru, entered the harbour in 1820. A Chilean army landed here in 1838, and the Chileans bombarded the town in 1880. It gave its name to the peace that ended the war between Chile and Peru in 1883.

During the Second Great War, Ancona, occupied by German forces, was captured by Polish troops on July 18, 1944, only after two days of bitter fighting. The harbour was blocked by the Germans with sunken vessels. A lamentable loss to art resulted from the bombing and shelling. Among damaged buildings was the cathedral dating from the 12th century, standing on the site of a temple of Venus, of which ten original columns survived. The museum and several historic churches and palaces were destroyed. Pop. (1951) 85,746.

**Ancona.** Prov. of N.E. Italy, in the Marches. It slopes N.E. from the Apennines to the Adriatic, is mountainous in the S.W., level in the N.E., and has an area of 748 sq. m. Fruit and cereals are produced, silkworms are bred, sulphur is mined, and paper, sugar, and bricks are manufactured.



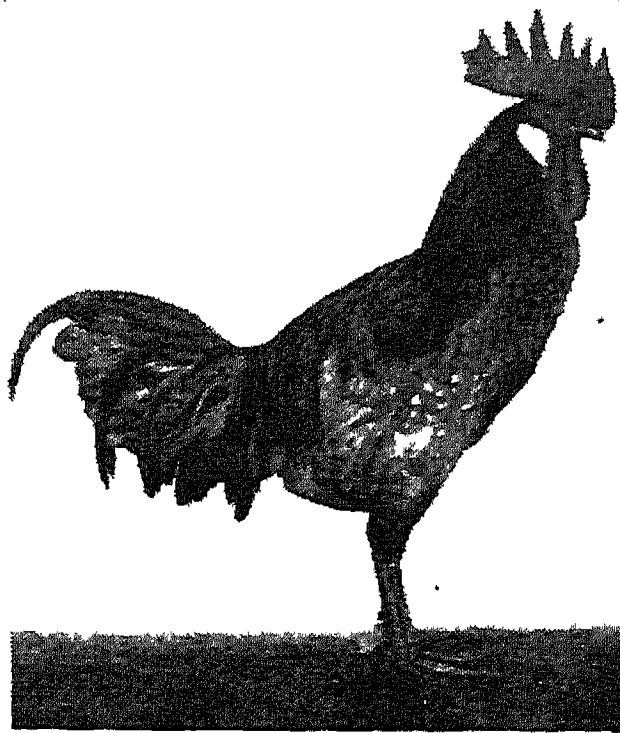
advanced line S. of Miraumont and Pys, and next day British troops occupied Serre, Miraumont, Pys, and Warlencourt, with the commanding ground near. Owing to the break-up of the intense frost which had followed an unusually wet autumn, close pursuit of the Germans was impossible while the whole country became a sea of deep mud. Irles, however, was stormed on March 10, and on March 13, after a terrific bombardment, Grévillers and Loupart Wood were seized by the British. Then followed the German retirement "according to plan" to the Hindenburg line (*q.v.*).

**Ancren Riwle.** A manual for anchoresses, attributed to Richard Poor, bishop of Durham. It prescribes a rule of life for three ladies, who, with a small company of lay sisters, led a religious life at Tarrant-Kaines in Dorset. The rule is dictated by a spirit of wisdom and common sense, forbidding excessive austerity, and is pointed by distinct and racy humour; it is further animated by a spirit of holiness that finds expression in many passages of extreme devotional beauty. The manual is usually attributed to the early 13th century, but is possibly older. Consult *Ancren Riwle*, ed. J. Morton, Camden Society, 1853.

**Ancrum.** Parish and village of Roxburghshire, Scotland,  $3\frac{1}{2}$  m. N.N.W. of Jedburgh. It was at Ancrum Moor, 2 m. N.W., that 5,000 English were defeated on Feb. 17, 1545, by the Scots. A monument marks the spot where Lilliard, a Scottish maiden, is said to have distinguished herself in battle. Of great antiquity, Ancrum has one of the best-preserved crosses in the Border country. Pop. 858.

**Ancus Marcius.** Fourth legendary king of Rome, 640-616 B.C. The reputed grandson of King Numa, he is credited with the foundation of the port of Ostia, at the mouth of the Tiber, and the fortification of the Janiculum, which he connected with the city by a wooden bridge, called the Pons Sublicius or bridge of piles. He is also said to have built the first Roman prison. He subdued the Latins, and brought some of them to the Aventine.

**Ancyra.** Ancient town of Asia Minor, site of the Ankara of today. Stone lion reliefs attest its importance in late Hittite times. Fortified about 250 B.C. by Gallic immigrants, it was made in 25 B.C. the chief town of the Roman province of Galatia. A marble tem-



Andalusian Fowl. Cockerel that won many prizes as a typical specimen

ple to Augustus contains the *Monumentum Ancyranum*, a mural record of the emperor's life-work. The Christian church is mentioned A.D. 192, and an ecclesiastical council was held here in 314.

**Andalusia.** Region of Spain, formerly one of the provinces. The name is variously said to be a corruption of Vandalusia, *i.e.* the land of the Vandals, or derived from the Moorish Andalus, land of the West. The region now comprises eight provinces: Almeria, Granada, Malaga, Cadiz, Jaén, Cordova, Seville, and Huelva. Its area is 33,777 sq. m.

Andalusia is in the S. of the country and, lying as it does on either side of Cape Trafalgar, its coasts front both the Atlantic and the Mediterranean. The land boundaries are Portugal, New Castile, and Murcia. It includes some of the most historic and interesting parts of Spain, *e.g.* the Moorish kingdom of Granada, the cities of Cordova and Seville, and the seaport of Cadiz. It chiefly consists of the valley of the Guadalquivir with the southern slopes of the Sierra Morena and the bulk of the Sierra Nevada between the river and the Mediterranean coast. It produces copper, principally from the rich Rio Tinto mines, and manganese, molybdenum, and platinum, also oranges, olives, and other sub-tropical fruits. It was a Roman province, and after the withdrawal of the Romans became the prey of various barbarian invaders. For about 800 years it was under the Moors, whose influence is still seen everywhere. Pop. (1950) 5,605,857.

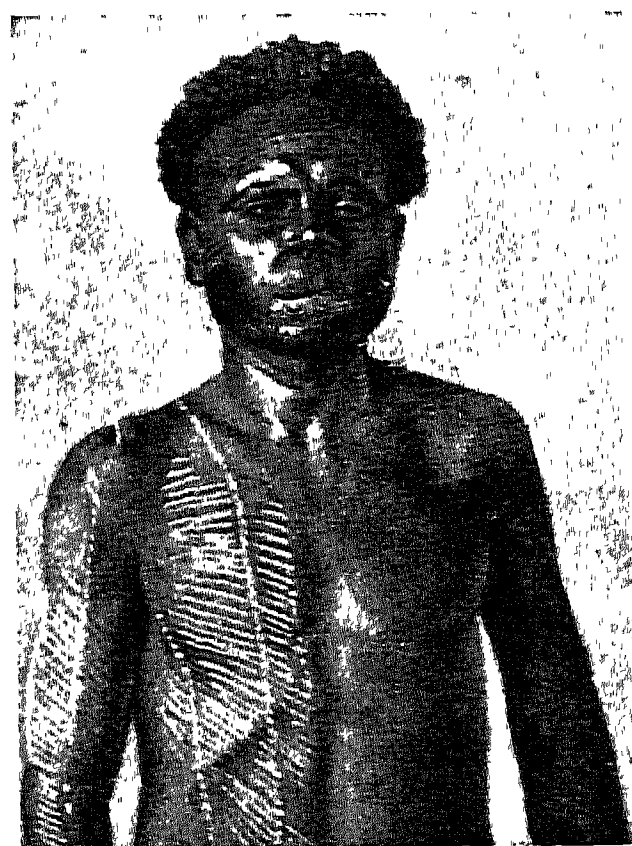
**Andalusian Fowl.** A Spanish breed of poultry introduced into England in 1851 from Andalusia. In egg production it compares favourably with other Mediterranean

breeds, laying a large, white-shelled egg. As it thrives equally well in confinement or at liberty, and is hardy and robust, it is adapted to farmer and backyarder alike. The body colour is a slate blue, laced with feathers of a darker tint: the legs are a dark leaden hue, earlobes white. The average weight of the cocks is 7 lb. to 8 lb.; and of the hens  $4\frac{1}{2}$  lb. to  $5\frac{1}{2}$  lb.

**Andalusite.** Aluminium silicate, of the same composition as sillimanite and cyanite. It crystallises in forms belonging to the orthorhombic system, is a product of the thermal metamorphism of aluminous sediments, and occurs most commonly in argillaceous rocks that have been heated by the intrusion of large masses of igneous rocks. The temperature required for its formation is less than that needed for sillimanite. It is used as a refractory material and for making cores for sparking plugs.

**Andamanese.** Aboriginal inhabitants of the Andaman Islands. They include the little-known Jarawa of the jungles of the main island group, and the Origi of Little Andaman. Their numbers have dwindled from several thousand to a few hundred. Dark-skinned and frizzy-haired, of negrito stock, and averaging 4 ft.  $10\frac{1}{2}$  ins. in height, they hunt land animals and fish with arrows, and, from dug-out canoes, turtle and shark with detachable harpoons. Their utensils are of shell; their huts are often lean-tos, roofed with cane leaves. Their animism is primitive.

The only people who do not know how to make fire, they live in groups of a few families, characterised by monogamy and patriliney. Their dialects are



Andamanese. Tribal chief of the North Andaman aborigines

descriptions of scenery and manners. It is, however, for his wonderful short tales for children that he is best remembered, and will be longest known. These include *The*

*Ugly Duckling*, *The Tin Soldier*, *The Little Match Girl*. These tales he brought out at intervals from 1835 into his old age. Only in the first volume is it stated that they were "told for children," but it is as children's tales they were, and are, accepted, although many of them were in fact written to score off literary opponents. He had a great esteem and affection for Charles Dickens, with whom he stayed in 1847 and 1857. A new translation of the tales from the original Danish into English by R. P. Keigwin, published in 1952, included reproductions of the original illustrations. On his 70th birthday Christian IX decorated him; and admirers presented an album containing one of his tales in 15 languages. He died at Copenhagen, Aug. 4, 1875. *Consult* *Autobiography*, Eng. trans. *The Mermaid Man*, 1955; *Lives*, S. Toksvig, 1933; *Rumer Godden*, 1955.

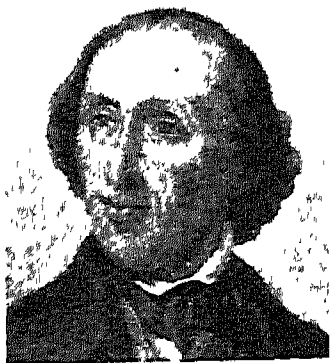
**Anderson**, Chief city of Madison county, Indiana, U.S.A. It stands on the White river, at the junction of several rlys., 35 m. N.E. of Indianapolis. It manufactures iron, steel, brass, paper, and glass. Pop. (1950) 46,820.

**Anderson**, CARL DAVID (b. 1905). American physicist. Born Sept. 3, 1905, in New York, he was educated at Los Angeles and Pasadena, and the Californian Institute of Technology, becoming lecturer in physics there, 1927, research fellow in 1930, professor in 1939. Devoting himself to research in gamma and cosmic rays, he discovered the positron (*q.v.*), and was awarded the Nobel prize for physics in 1936.

**Anderson**, ELIZABETH GARRETT (1836-1917). British doctor.



E. Garrett Anderson,  
British doctor



Andersen

Born in London, June 9, 1836, Elizabeth Garrett was educated privately and at a private school. In 1860, encouraged by her father, she sought to study medicine, but,

because of her sex, was unable to obtain admittance to any of the British medical schools. In 1865 she gained the L.S.A. diploma of the Society of Apothecaries, which allowed her to put her name on the medical register, and the next year she opened a dispensary in Euston Road, London, that developed into the New hospital for women (renamed in 1917 the Elizabeth Garrett Anderson hospital in her honour), of which she was senior physician for 24 years. Graduating as M.D. in Paris in 1870, she was for 23 years lecturer and for 10 dean of the London school of medicine for women. She was a member of the first London school board, 1870. Her greatest victory was, perhaps, her success in getting reversed in 1892 a motion of 1878 by the British Medical Association excluding women from membership of that organization. In 1908 she became mayor of Aldeburgh, Suffolk, the first woman to hold mayoral office in England. She died at Aldeburgh, Dec. 17, 1917. She married J. G. S. Anderson, a shipowner, in 1871. Their son, Sir Alan Garrett Anderson (1877-1952), was controller of the navy during 1917-18 and during 1941-45 controller of railways under the ministry of War Transport and chairman of the railway executive. Their daughter, Dr. Louisa Garrett Anderson (1873-1943) organized during the First Great War the first army hospital which was managed and officered by women in France. She published a life of her mother, 1939.

**Anderson**, JAMES (1739-1808). Scottish agricultural economist. Born at Hermiston, near Edinburgh, he became a farmer when little more than a boy, at first near his birthplace, then in Aberdeenshire. He studied chemistry and sought to apply science to the service of agriculture; and is regarded as the inventor of the Scottish plough, a small two-horse plough without wheels. In 1777, in one of his pamphlets, he anticipated Ricardo's theory of rent. In 1783 he gave up his farm and settled in Edinburgh, where for some years he conducted a weekly paper, *The Bee*. His last years were passed at Isleworth, where he continued his experiments in agricultural processes. He died Oct. 15, 1808.

**Anderson**, SIR JOHN (b. 1882). An account of the career of this British administrator and politician will be found under the heading *Waverley*, Viscount, the title he took on elevation to the peerage

in 1952. The Anderson Shelter named after him is described under that heading.

**Anderson**, SIR KENNETH ARTHUR NOEL (b. 1891). British soldier. Born on Christmas day, 1891, he was educated at Charterhouse and Sandhurst. In the First Great War he served with distinction, and during 1930-31 he was stationed on the N.W. frontier of India. During the Second Great War he commanded a division at Dunkirk in 1940, and was appointed G.O.C.-in-C. Eastern Command in April, 1942. In Nov. of the same year he commanded the British 1st army (at first scarcely a division in strength) that landed in Algeria in Nov., 1942, and assisted, at first directly under Eisenhower, later under Alexander, in carrying out the strategy which led to the final defeat of the Axis in N. Africa (*see* *Tunisia*, *Battle of*). G.O.C.-in-C. in E. Africa, 1945-46, Anderson was governor and c.-in-c. Gibraltar 1947-52, after which he retired from the army.

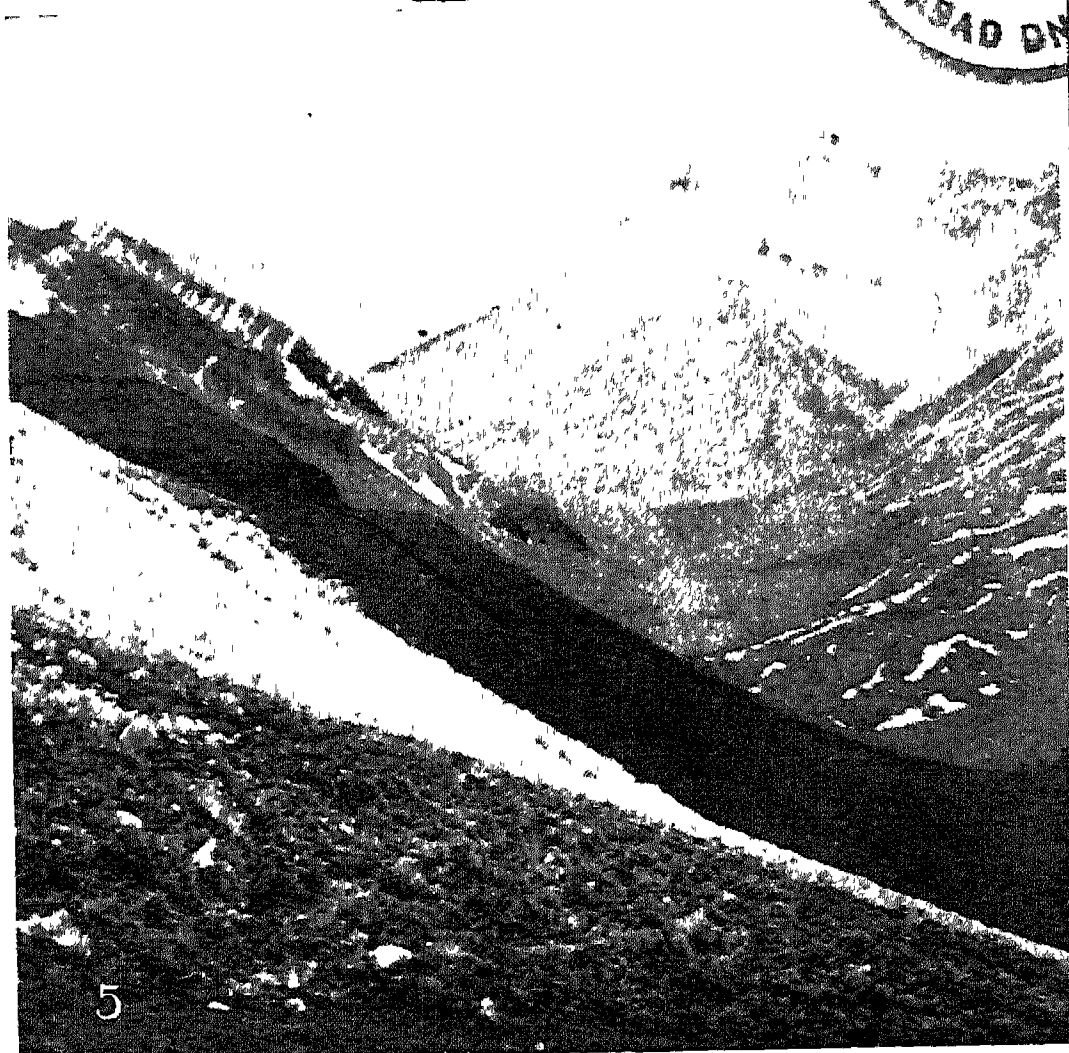
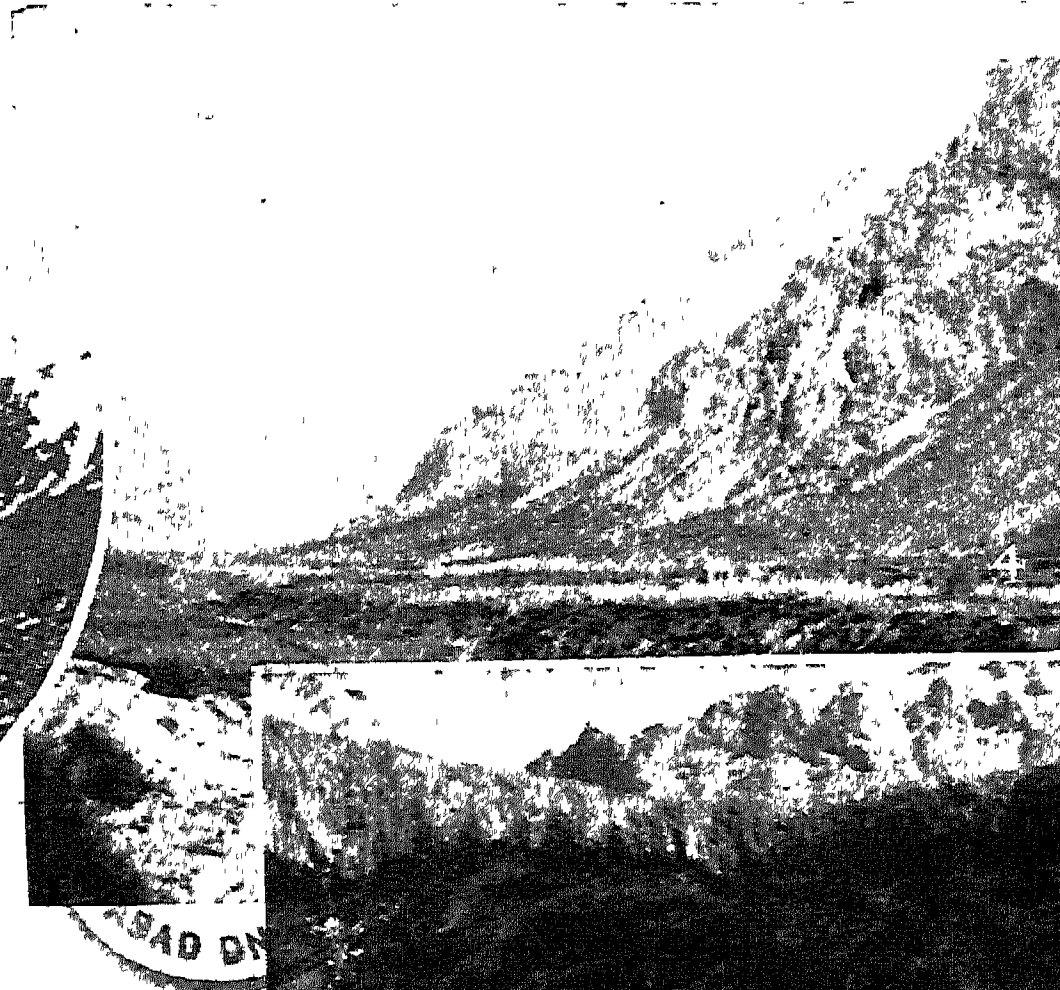
**Anderson**, MARY ANTOINETTE (1859-1940). American actress.

She was born at Sacramento, California, July 28, 1859, the daughter of an English father and a German mother. When she was only six months old her parents moved to Louisville, Kentucky, where she was educated at a convent. She made her first appearance on the stage as Juliet, Nov. 27, 1875. After achieving enormous success in her own country she came to England where, during 1883-87 she had seasons in London, occupying the Lyceum Theatre during the absences of Henry Irving in America. Her chief productions were *Ingomar*, *The Lady of Lyons*, *Gilbert's Pygmalion* and *Galatea*, *Romeo and Juliet*, and *A Winter's Tale*, in which she doubled the parts of *Hermione* and *Perdita*. In 1885 she appeared as *Rosalind* at the Shakespeare memorial theatre, Stratford-upon-Avon. She made her last professional appearance, in *A Winter's Tale*, at Washington, D.C., before retiring in 1889. In 1890 married Antonio de Navarro (d. 1932), and settled in England, where she lived until her death, May 29, 1940. She published *A Few Memories*, 1896.



Mary Anderson,  
American actress





1. Rocky pinnacled mass known as Los Penitentes (The Penitents). 2. In the Uspallata Pass, Chile. 3. Christ of the Andes, colossal statue at Puente del Inca, on the Argentine-Chile border. 4. View in the Andes showing the character of the slopes. 5. Cerro Tolosa, above the snow line. 6. A natural rock bridge known as the Bridge of the Inca

**ANDES: AMONG HIGH PLACES IN THE GREAT MOUNTAIN SYSTEM OF SOUTH AMERICA**



**Andesite.** Lava characterised by the presence of plagioclase feldspar, chiefly andesine, a moderately high percentage of silica, and usually a porphyritic structure. Glassy matter commonly forms the matrix of such rocks. Andesites, well represented among the lavas of the Andes Mts., from which they take their name, occur in most regions of volcanic activity.

**Andhra.** Governor's state of the Union of India. Formerly the northern part of Madras state, it consists of the Telugu-speaking section of that state, and was inaugurated Oct. 1, 1953. The capital is Kurnool. Area, 63,608 sq. m. Pop. (1951) 20,801,192.

The Eastern Ghats run the whole length of the N. and W. borders. These are huge forest areas, especially in the districts of Srikakulam, Godavari, and Kurnool. The landscape is very varied and rich. The principal commercial crops are tobacco (80 p.c. of India's total), groundnuts, and cotton. Industries include mining of manganese, mica, and chromite, sugar refining factories, and a growing forestry industry.

**Andhra University.** Established in 1926, it is at Waltair (immediately N.W. of Vizagapatam), Andhra state, India. There are 20 departments, and 28 colleges are affiliated to it. One of the aims of the university is the development of the Telugu language.

**Andijan.** Town of Uzbek S.S.R., capital of Andijan region and of the Khokand khanate. It lies near the Syr Daria, 170 m. E. of Tashkent, and is a rly. centre with textile mills, food processing plants, and chemical factories. Almost completely destroyed by an earthquake in 1902, it was rebuilt. Pop. (est.) 90,000. The region, part of the Ferghana valley oasis, produces cotton, silk, and petroleum. Area 1,600 sq. m. Pop. (est.) 600,000.

**Andkhui.** Khanate and town of Afghan Turkistan, on the Russian border. The town is 100 m. W. of Balk and was subject to Bokhara until 1820, when Mahmud Khan

captured and destroyed it. The khanate was formally annexed to Afghanistan in 1855. Its climate is unhealthy, and flies and scorpions abound.

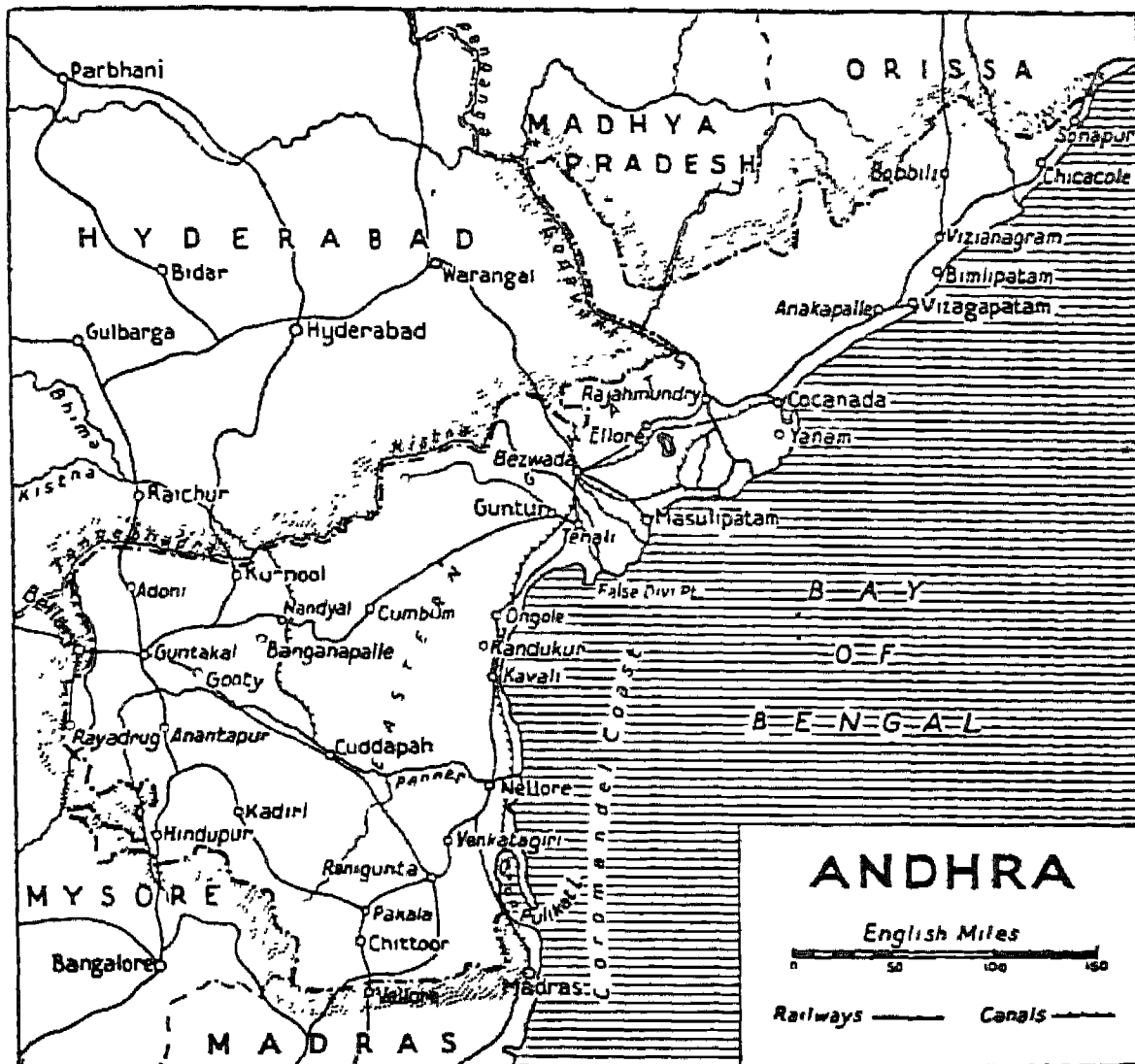
**Andocides** (c. 467–c. 390 B.C.). Athenian orator, one of the "ten"

reared, and there is a tourist trade. A good road runs via the capital, between the Spanish and French frontiers, and there is a hydro-electric power-station on the Catalan grid. Smuggling is fairly general. The republic of

Andorra is under the joint suzerainty of France and the bishop of Urgel, who maintain permanent delegations for Andorran affairs at Perpignan and Urgel. The government is entrusted to an elected council of 24 members, who choose a first and second syndic to preside. Judicial power is exercised by two *viguiers*, or magistrates, and two civil judges and a judge of appeal, all appointed by the suzerains. Final appeal is to Perpignan or Urgel. A bi-annual payment of 960 fr. is made to the French govern-

ment and about 460 pesetas to the bishop of Urgel, obtained by a pastures tax. France provides education and postal services.

Andorra, sole survivor of several small frontier republics, is reputed to have received its name and independence from Charlemagne, who freed it from Saracen invaders. For long its ownership was disputed by the bishops of Urgel and the counts of Foix, until their joint suzerainty was agreed upon in 1278. The rights of the counts of Foix passed by marriage to the house of Béarn, later united to Navarre, and thus to the kings of France. The constitution dates from 1868.



Andhra. The first linguistic state of India, formed 1953

Attic orators. In 415 B.C. he was forced to leave Athens under suspicion of being concerned with Alcibiades in the mutilation of the statutes of the Hermae. After two unsuccessful attempts, in 390 he cleared himself of the charge. Of his three surviving speeches the most important was that delivered in 390, in which he advocated peace with Sparta on her own terms.

**Andorra** (Arab. Aldarra). Republic in the eastern Pyrenees between the Spanish prov. of Lerida and the French depts. of Ariège and Pyrénées-Orientales. It comprises the upper part of the valley of the Valira, an affluent of the Segre, and adjacent valleys. Area 190 sq. m. Pop. (est.) 5,200. Andorra la Vieja, the capital, has about 600 inhabitants. The language is Catalan. The forests, formerly valuable, are rapidly disappearing. Tobacco, maize, and vegetables are grown on terraces. Sheep and cattle are



Andorra. The Parliament House of the small republic situated in a valley of the eastern Pyrenees





Andrea del Sarto. His well-known  
"Portrait of the Artist"  
National Gallery, London

misappropriated funds entrusted to him for the purchase of works of art. Though plentifully employed in Florence, he gradually sank into indigence, and finally fell a victim to the plague, Jan. 22, 1531.

He is finely represented at the Uffizi and Pitti galleries, and in the National Gallery, London, by a Holy Family and a portrait of himself. His famous frescoes include the Cenacolo of the S. Salvi Convent, the series of S. Philip Benizzi in the Church of the Annunziata at Florence, and the Scalzo series. Del Sarto, contemporarily nicknamed "the faultless painter," had an imitative and a creative genius, a great sense of structure, drawing, and colour, and a marked homeliness of style. The conflict between his art and his amours is the subject of a discerning poem by Browning.

**Andreani**, ANDREA (c. 1560-1623). An Italian wood engraver. He was a native of Mantua. He engraved pictures after Mantegna, Raphael, Titian, Parmigiano, Beccafumi, and other masters. He drew in a free and vigorous style and obtained his chiaroscuro by printing from several blocks of various shades, much after the method employed in chromolithography. His prints are rare.

**Andreas**. Unsigned poem attributed to Cynewulf, preserved in the Early English MS. known as the Vercelli Book. The story is based on the Acts of S. Andrew and S. Matthew, a Greek MS. which contains the adventures of those apostles among cannibals of Africa. In the Andreas both the speech and the setting are changed to English. S. Andrew sails to England with a company of thanes

and angels, with Christ among them. After landing he rescues S. Matthew and suffers persecution; most of his persecutors are destroyed by flood and fire, and after converting the remainder he founds a church and puts to sea.

**Andredsweald**. Early English name of a woodland waste extending from Folkestone to Southampton Water, between the N. and S. Downs. This uninhabited wild—now the Weald—long formed a barrier between the Sussex and Wessex kingdoms, traversed only by Stane Street (*q.v.*). Its timber was afterwards employed for smelting Sussex iron. Scattered relics of the original forest remain in Ashdown and Tilgate, as well as in avenues along many of the roads, and in long lines of trees separating the farmers' fields.

**Andrée**, SALOMON AUGUST (1854-97). Swedish balloonist. He was born at Grenna, Oct. 18, 1854. He showed early a marked interest in ballooning, and worked at a plan for reaching the North Pole in this way. In July, 1897, accordingly, he left Danes Island, Spitzbergen, with two others. Nothing more was learnt of him until the summer of 1930, when a party of Norwegian scientists discovered the bodies of Andrée, Strindberg, and Fraenkel on the ice at White Island, near Franz Josef Land. With the bodies were found logs and diaries recording the balloon's progress and descent on the ice, also many valuable photographic negatives.

**Andrew** (Gr. *andreios*, manly). Masculine Christian name. It is

especially popular in Scotland, largely because S. Andrew became the patron saint of that country. It is also used in countries where the Greek Church is dominant, *e.g.* Russia and Greece.

**Andrew**, SAINT. One of Christ's apostles. A native of Bethsaida, a fisherman, and a follower of John the Baptist, he left the latter to follow Jesus (John 1), to Whom he immediately brought his brother Simon Peter. With his brother he was one of the two first called to apostleship (Mark 1), to be "fishers of men." Prominent at the feeding of the 5,000 (John 6), and on the occasion when certain Greeks sought to see Jesus (John 12), he was one of those who on the Mount of Olives heard the prophecy of the fall of Jerusalem (Mark 13). The accounts of his later life are purely traditional. He is said to have preached in Scythia and so to have become patron saint of Russia, and to have suffered martyrdom at Patrae about A.D. 70, being bound with cords to a cross decussate (X). A woman named Maximela had his body embalmed and suitably interred, and part of his cross is said to be in one of the piers supporting the dome of S. Peter's at Rome. Tradition adds that his relics were removed to Constantinople, whence some of them were taken in the 8th century to Scotland, of which country he is also the patron saint. As S. Andrew's day, Nov. 30, is the festival nearest to Advent Sunday, it must always fall either at the beginning or at the end of the Church year.



Andrew. The martyrdom of S. Andrew, one of Christ's apostles, depicted by the great Spanish painter Murillo

Madrid





"THE CAPTIVE ANDROMACHĒ": ONE OF THE FINEST EXAMPLES OF LORD LEIGHTON'S PAINTINGS OF CLASSICAL THEMES  
*Manchester Art Gallery*

by Bernard Shaw. It was produced Sept. 1, 1913, at The St. James's, London, where it had a short run. The piece is an attempt to remove the halo from the first martyrs and to analyse the psychology of martyrdom, slaves of various temperaments, including Androcles, being contrasted with the brave patrician lady, Lavinia (played by Lillah McCarthy).

**Andromachē.** In Greek legend, wife of Hector. Homer's description of Hector's parting with his wife and infant son, Astyanax, before going to his fatal duel with Achilles is one of the finest passages in the Iliad. After the taking of Troy, Andromachē became the captive of Neoptolemus, son of Achilles, who took her back with him to his kingdom of Epirus. She afterwards married Hellenus, a brother of Hector. The sorrows of Andromachē are the subject of tragedies by Euripides and Racine.

**Andromeda.** In Greek mythology, the daughter of Cepheus, king of Ethiopia. Her mother, Cassiopeia, having boasted that Andromeda was more beautiful than the Nereids, Poseidon, persuaded by the latter, sent a monster to ravage her country. An oracle declared that the monster could be got rid of if Andromeda were sacrificed to it, and so the unfortunate maiden was chained to a rock, to await her doom. She was saved, however, by Perseus, who turned the monster to stone by showing it the head of the Gorgon Medusa.

**Andromeda.** Constellation in the northern hemisphere, most readily identified in such latitudes during the autumn. It forms one of a group of constellations which preserve the legend of Perseus and Andromeda. It is easily detected by reference to the well-known Cassiopeia's



Michael IX and grandson of Andronicus II. in 1325 he became joint Emperor, with his grandfather, whom in 1328 he forced to abdicate. He took Chios and parts of Acarnania, Epirus, and Thessaly but lost most of Asia Minor to the Turks.

**Androphagi** (Gr. *anēr*, man; *phagein*, to eat). Cannibal tribe said by Herodotus (IV, 18) to dwell by the Borysthenes (Dnieper) river beyond a desert which separated them from the Scythians. Ptolemy and Mela also mention them. The practice of eating their dead, especially their executed criminals, is often attributed to the Tibetans and Chinese in medieval travel literature.

**Andros** OR ANDRO. Island of the Greek Archipelago. The most northerly of the Cyclades, it is 25 m. long and 9 m. broad, mountainous, but very productive. In ancient times it was famed for its wine, and therefore sacred to Dionysus. It was subject in turn to Persia, Athens, Macedonia, Pergamus, and Rome. Andros, on the E. coast, is the chief town. Pop. (est.) island, 18,000; town, 3,000.

**Andros.** Largest island of the Bahamas, British West Indies. It is 105 m. long and from 20 m. to 45 m. wide. Low and swampy, it is divided by lagoons into three principal and many smaller parts. Its forests are exploited for timber; wooland sponges are also produced. The southern marshes are the most important breeding-ground of the scarlet flamingo in the western hemisphere. Pop. (est.) 7,000.

**Andros, SIR EDMUND** (1637-1714). An English colonist, the founder of William and Mary College, Williamsburg, Va., 1693. He was governor of the colony of New York 1674-81. In 1678 he was knighted, and in 1685 was appointed governor of New England, where his



Sir Edmund Andros, English administrator

policy of a strong central council, complete liberty of conscience, and a strong army and navy (the army to oppose the Indians, the navy against pirates) brought him an increasing unpopularity. In April, 1689, he was suddenly arrested by the citizens of Boston, and was sent to England, but was released at once, and without trial, on arrival. He was governor

of Virginia, 1692-98; of Jersey, 1704-06. He died in London, Feb. 27, 1714.

**Androscoggin.** River of New Hampshire and Maine, U.S.A. Issuing from lake Umbagog, it flows mainly S. about 160 m. to join the Kennebec above Bath, 18 m. from its mouth. The Androscoggin gives its name to a county in Maine, and is a source of water-power.

**Andujar.** Town of Spain, in Jaén prov. On the Guadalquivir, 48 m. by rly. E.N.E. of Córdoba, it is noted for porous earthenware jars for keeping water cool; they are made from white clay found locally. Pop. 18,000.

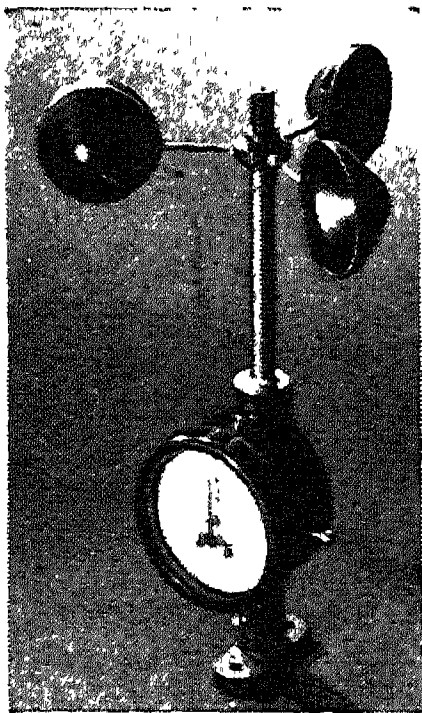
**Anecdote** (Gr. *anekdota*, not published). Term originally signifying an event of secret history. Later it came to mean a short narrative of an event in the life of a man or woman showing some characteristic peculiar to the person who was its subject. It is used thus in the titles *The Percy Anecdotes*, T. Byerley and J. C. Robertson, 1820-23, and *18th-Century Anecdotes*, J. Spence, 1920.

**Anegada** (Spanish, drowned). Northernmost isle of the Virgin Islands, British West Indies. It is of coral formation, low and flat, about 10 m. long, and very narrow. The encircling reefs are dangerous.

**Anemochord** (Gr. *anemos*, wind; *chordē*, string). A musical instrument of the harpsichord kind, played by jets of compressed air. It was invented by Johann Schnell, of Württemberg, in 1784, to reproduce the tones of the aeolian harp, and was played with great success by the inventor and by the German pianist Hummel. Marie Antoinette offered a large sum for it. The secret of its construction died with its discoverer.

**Anemometer** (Gr. *anemos*, wind; *metron*, measure). Instrument for measuring wind velocity or force. The cup type is the most familiar. It consists of three or more conical or hemispherical cups attached to horizontal arms mounted on a vertical shaft. A suitable mechanism measures the speed of rotation

of the shaft, and from this the wind velocity is obtained. A vane anemometer uses a light fan instead of cups. Pressure tube anemometers depend on the pressure difference induced by air currents in suitably shaped pipes. The pressure plate measures the force exerted by the wind on plates set at right angles to the stream. Hot wire anemometers indicate the cooling effect of an airstream from which its velocity can be ascertained. Meteorologists convert wind velocities into Beaufort index numbers (see Beaufort Scale).



Anemometer, for measuring the velocity of wind

**Anemone** OR WIND-FLOWER. Genus of perennial herbs of the family Ranunculaceae, consisting of about 70 species, widely distributed in temperate and alpine regions. Some have tuberous rootstocks, from which the divided or lobed leaves spring direct. In spite of the fact that they have no petals, they all have handsome flowers, the sepals being large and either brightly coloured or white.

One of the most charming species is the wood anemone (*A. nemorosa*) of northern Europe and North America. It is about 6 ins. high, and fills the woods in spring with its solitary white flowers and purple-tinged buds. Familiar garden anemones, the poppy anemone (*A. coronaria*), of which the St. Brigid anemone is a cultivated strain, and the flame anemone (*A. hortensis*), both about 12 ins. in height, are natives of the Mediterranean regions, whence they were introduced into English gardens at

the end of the 16th century. These have tuberous roots. The European hepatica (*A. hepatica*) and the Japanese anemone (*A. japonica*), are about 2 ft. in height, and have, like the wood anemone, long, fleshy, creeping rootstocks. *A. apennina*, from S. Europe, has bright blue flowers.



Anemone. Wild wood anemone

*A. ranunculoides*, also European, has blossoms of golden yellow, a colour rare among anemones. The pasque-flower (*A. pulsatilla*), a



Angel. Raphael, "one of the seven holy angels which present the prayers of the saints," and Tobias. By the Italian painter Raphael  
Louvre, Paris

came to be regarded as obligatory, only certain classes of citizens, such as soldiers and professors, being exempt. Later, angary was used for any kind of feudal burden or forced service, and, in the Middle Ages, for the right of a belligerent to seize neutral merchantmen and their crews for warlike purposes.

The modern definition of the right of angary (*droit d'angarie*) is "an act of the state by which foreign as well as private domestic vessels which happen to be within the jurisdiction of the state, are seized and compelled to transport soldiers, ammunition, or instruments of war; in other words, to become parties against their will to carrying on direct hostilities against a power with whom they are at peace." During the Franco-Prussian War of 1870-1, some English vessels in the Seine were sunk by Germans to prevent French war vessels from entering the river. The

plea of military necessity was set up and accepted, and the owners were compensated. The Hague regulations allow railway and other materials belonging to neutrals to be commandeered and even destroyed. During the First Great War, the Allies claimed by virtue of this custom the right to seize and make use of Dutch and other neutral vessels lying in British and (later) U.S. harbours.

**Angas, GEORGE FIFE** (1789-1879). British colonist. Born at Newcastle-on-Tyne, May 1, 1789, he made a fortune as shipowner and merchant, and in 1833 retired to Devonshire. Becoming interested in colonial development, he was appointed a commissioner under the Act of 1834 establishing the colony of South Australia, and guaranteed £35,000 to the South Australian Company for purchase of land and settlement of emigrants. Having suffered heavy

losses through his colonial agents, he himself went out to Adelaide in 1851 and spent the rest of his life in the colony, devoting to it all his energies and means. He was a founder of the National Provincial Bank of England, the Bank of South Australia, and the Union Bank of Australia. He died at Adelaide on May 15, 1879. The S. Australian township of Angaston, 51 m. by rly. N.E. of Adelaide, was named after him.

**Angel** (Gr. *angelos*, messenger). Spiritual being intermediate between God and man, to whom frequent reference is made in the Bible and in Babylonian and Zoroastrian literature. According to the O.T. angels were created by God (Ps. 48), and have two functions: (1) They are the messengers of God sent to guide and assist His people, the common and usual work ascribed to them. (2) They are the attendants upon God's throne, in the hierarchy of heaven. Mention is rarer in this connexion, but see Dan. 7 and Ps. 148.

In the N.T. the same functions are recorded. An angel announces to the Virgin Mary that she is to be the mother of Christ; angels are seen at the birth of Christ, and in Revelation they are described as ministering in heaven. On many occasions in the N.T. angels serve and assist Christ, as later they serve certain of the apostles. Christ refers to their good offices more than once, and in Matt. 18 alludes to them as guardian angels. While the general rule is that angels are sinless beings solely devoted to God's service, reference is also made in the Bible to fallen angels, whose function is the trial and temptation of man. Satan is referred to in Job and in Matt. 25 as the chief of these, and the dragon in Revelation may be taken as a similar example. Unlike the Zoroastrian ministers of darkness, who serve an eternal principle of evil, the fallen angels of the Bible are subject to God.

In the hierarchy of heaven four angels are named as archangels: Uriel, Michael, the warrior of Revelation, Gabriel of the Annunciation, and Raphael of the book of Tobit. Angels being creations of God, the members of the Christian church are forbidden to offer them worship due to God; but from the 4th century they have been objects of veneration. The reference to the angels of the seven churches in Revelation is variously interpreted, the most commonly accepted view being that the bishops of the churches were designated by it.



paint a chapel in the Vatican, he removed to Rome, where he died March 18, 1455, being buried in Santa Maria sopra Minerva.

Fra Angelico's art is remarkable for its elaborate figure composition, rich colouring, and ecstatic though simple sentiment. He had the training and instinct of an illuminator, and the precious quality of his craft is easily discernible even in his largest paintings. He is best represented at Florence, where, in addition to the San Marco frescoes, there are numerous works in the Academy and the Uffizi Gallery. Among the most celebrated of these are the Madonna of the Linen-weavers (1433), in the Uffizi, and the Deposition, the Last Judgement, and 35 small panels of the life of Christ, in the Academy. One of his early works, an altar-piece of the Virgin and Child with saints, is in the Church of S. Domenico, Cortona; others are at Rome, Orvieto, Parma, Perugia, Fiesole, and Pisa. The National Gallery, London, possesses a Resurrection, formerly the lower panel of the S. Domenico altar-piece, and the Louvre has the Coronation of the Virgin. *Consult* Lives, V. M. Crawford, 1900; L. Douglas, 1900.

**Angel Inn.** Former London hostelry, converted into a café in 1921. Situated at the N. end of the City Road and the corner of Pentonville Road and High Street, Islington, it was rebuilt in 1819 and 1880. One of the old posting inns, it was the first stop for those travelling northwards from London, and the original building has the customary galleries running round the yard. Here in 1790 Thomas Paine wrote *The Rights of Man*.

**Angell, Sir NORMAN** (b. 1874). British writer and politician. Born on Dec. 26, 1874, as Ralph Norman



Sir Norman Angell,  
British writer

Angell Lane, he later changed his name by deed poll. Educated at the Lycée de St. Omer, France, and the university of Geneva, he ran away to the U.S.A. in 1891 to be a cowboy, and during a seven-year stay began to write for San Francisco and St. Louis papers.

In 1898 Lane went to Paris and after editing Galignani's *Messenger*

(an English paper), 1899-1903, was general manager of the newly-founded *Continental Daily Mail* 1905-14. In 1909 he published at his own expense *Europe's Optical Illusion*. A revised and enlarged edition which appeared in 1910 as *The Great Illusion* became one of the most widely read books of the day. Its central thesis was that in modern war both "victors" and "vanquished" must be losers. It was translated into some 25 languages and sold over a million copies. For a time Angell's pacifism made him unpopular.

Angell was Labour M.P. for N. Bradford 1929-31. He was knighted in 1931 and received the Nobel peace prize in 1933. Among later books were *For What Do We Fight?*, 1939; *America's Dilemma*, 1940; and the autobiographical *The Steep Places*, 1947, and *After All*, 1951.

**Angelo.** Leading male character in Shakespeare's *Measure for Measure*. Left as his deputy by Vincentio, duke of Vienna, he revives certain laws against incontinence under which Claudio is arrested and sentenced to death. Besought by Isabella, Claudio's sister, to pardon her brother, he



ANGELO'S VISION OF PARADISE: FROM HIS GREAT PAINTING, THE LAST JUDGEMENT  
Small section of the original masterpiece in the Academy at Florence

anger is the impulse to inflict suffering upon another in order to gratify oneself seems extreme.

**Angerman.** River of Sweden. Rising near the Norwegian border. it flows S.E. and enters the Gulf of Bothnia through a long estuary N. of Hernösand. Its length, including the headstream and some lakes, is 242 m. The river is used for floating timber from the extensive forests through which it flows. With its tributaries it drains 12,600 sq. m. and it is navigable by small craft for about 70 m.

**Angers.** City of France, formerly the capital of the duchy and prov. of Anjou. Standing on the Maine, a few miles above its junction with the Loire, 212 m. by rly. S.W. of Paris, it is the chief town of the department of Maine-et-Loire. Here the rivers Sarthe and Mayenne meet to form the Maine, and the town is a natural converging point of roads and railways. Around the ancient town lie new and spacious suburbs. Its commercial prosperity is due to its position in a fertile district where abundant vegetables, fruit, and

some picturesque old houses and an episcopal palace; its modern buildings include the palais de justice and a hospital. The ancient Andegavum, its early importance began when it became the residence of the counts, afterwards dukes, of Anjou. Until the Revolution it had a famous university. Pop. (1954) 102,142. From Nov., 1939, to June, 1940, Angers was the seat of the refugee Polish govt. The city was bombed by Allied aircraft on June 3, 1944, and liberated by U.S. troops on Aug. 11, 1944.

**Angerstein, JOHN JULIUS** (1735-1823). British art connoisseur of Russian descent. He was born at St. Petersburg and came to London in 1749. He amassed a fortune which he spent in philanthropy and on a remarkable art collection. After his death at Blackheath, Jan. 22, 1823, on the advice of Sir Thomas Law-

Angevin, being another grandson of Edward III, is more usually regarded as the first king of the house of Lancaster. These Angevin kings are generally known as Plantagenets. See Plantagenet.

**Angilbert** (d. 814). A French saint and poet. He was educated at the court of Charlemagne, where, under Alcuin, he studied Latin and Greek. He became count of the palace to Pepin when that prince was crowned king of Italy in 782. Returning to France, he fell in love with Charlemagne's unmarried daughter, Bertha, and became by her the father of two children, one of whom was the chronicler Nithard. In 790, on the advice of Alcuin, then abbot of Tours, and with the consent



Angers, capital of the old French province of Anjou. General view of the city as seen from the castle. Above: Entry to the castle

flowers are grown, to the small coal mines and slate quarries close by, and to manufactures of liqueurs, wine, and clothing.

Angers has been the seat of a bishop since the 3rd century, and its cathedral, dedicated to S. Maurice, was built in the 12th and 13th centuries, and added to in the 16th. S. Serge's is another old and interesting church. The castle, formerly a stronghold of the dukes and now an armoury, is a fine example of its kind, and dates from the 13th century. The Hôtel d'Anjou dates from three centuries later. In the city are the medieval abbey of S. Aubin and hospital of S. John. Angers has

rence and other connoisseurs the Government asked for and obtained a grant of £60,000 for the purchase of his pictures, and they formed the nucleus around which have grown the treasures in the National Gallery (*q.v.*).

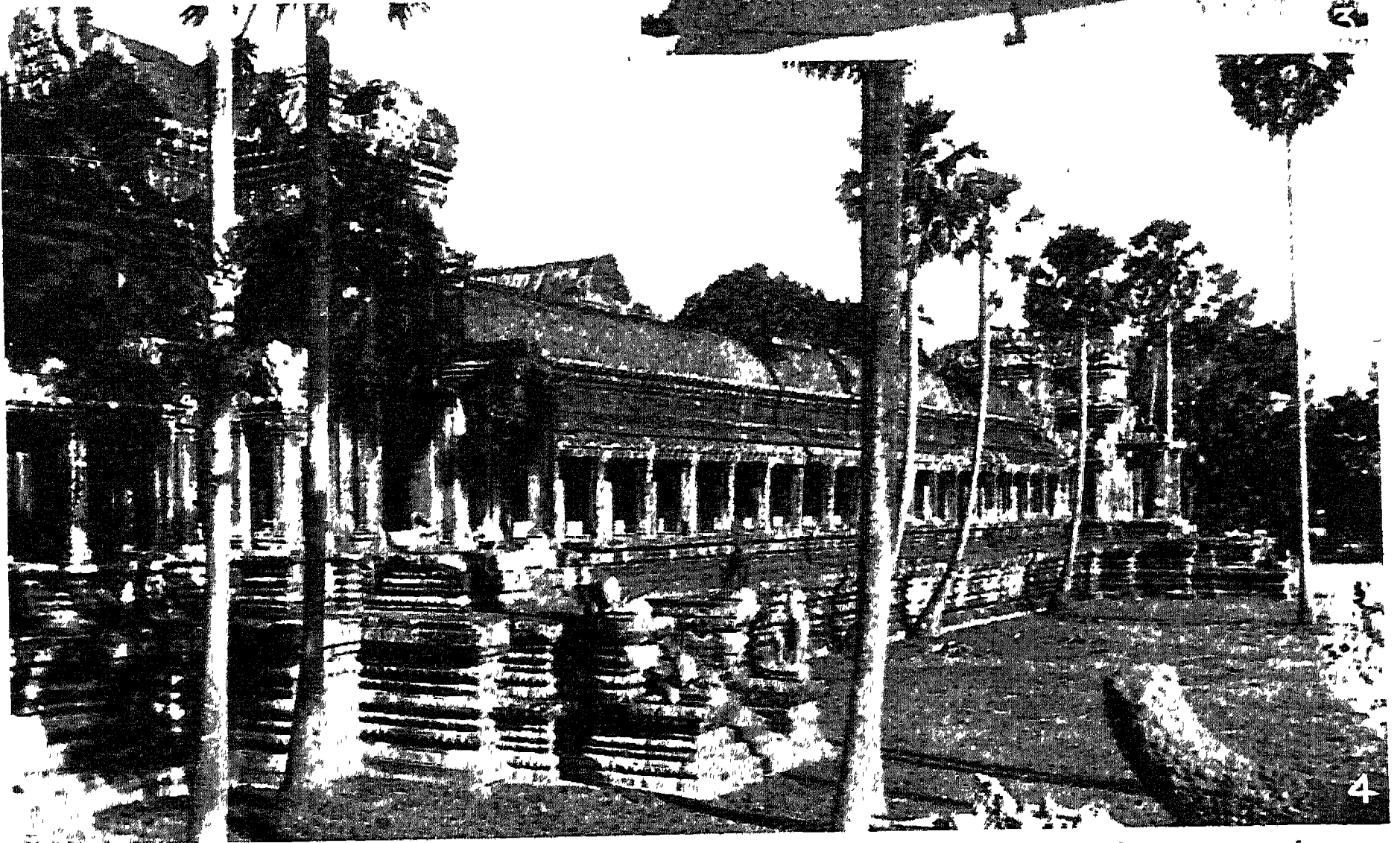
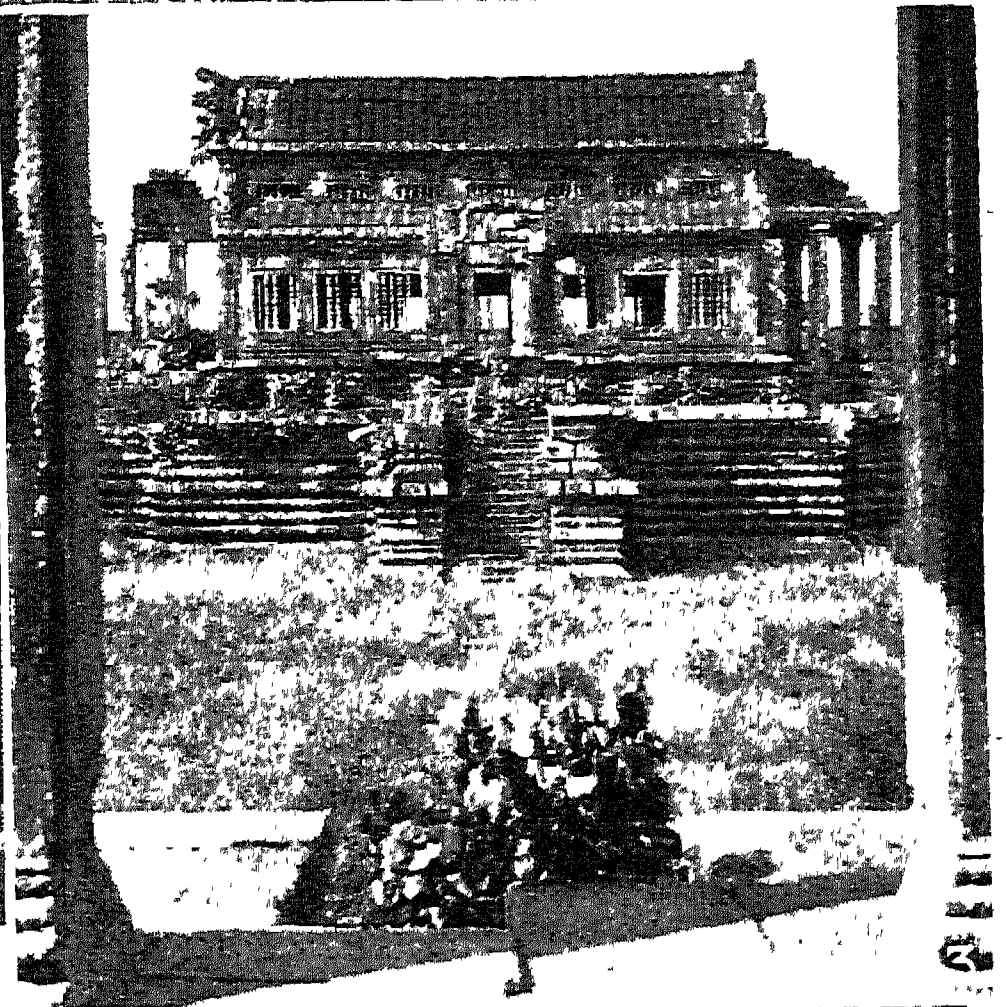
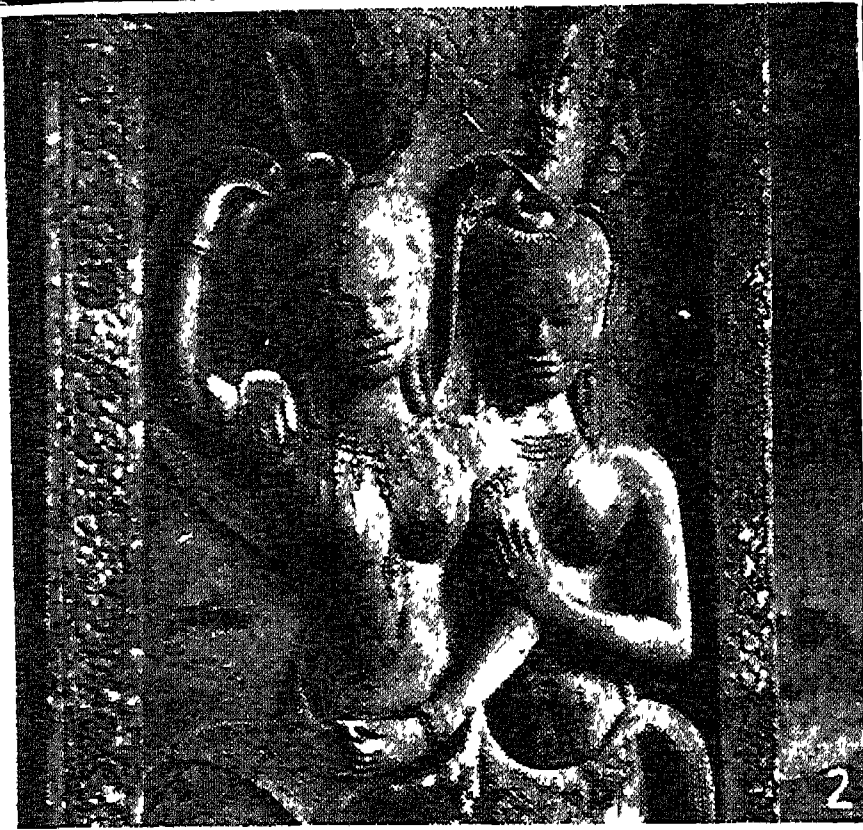
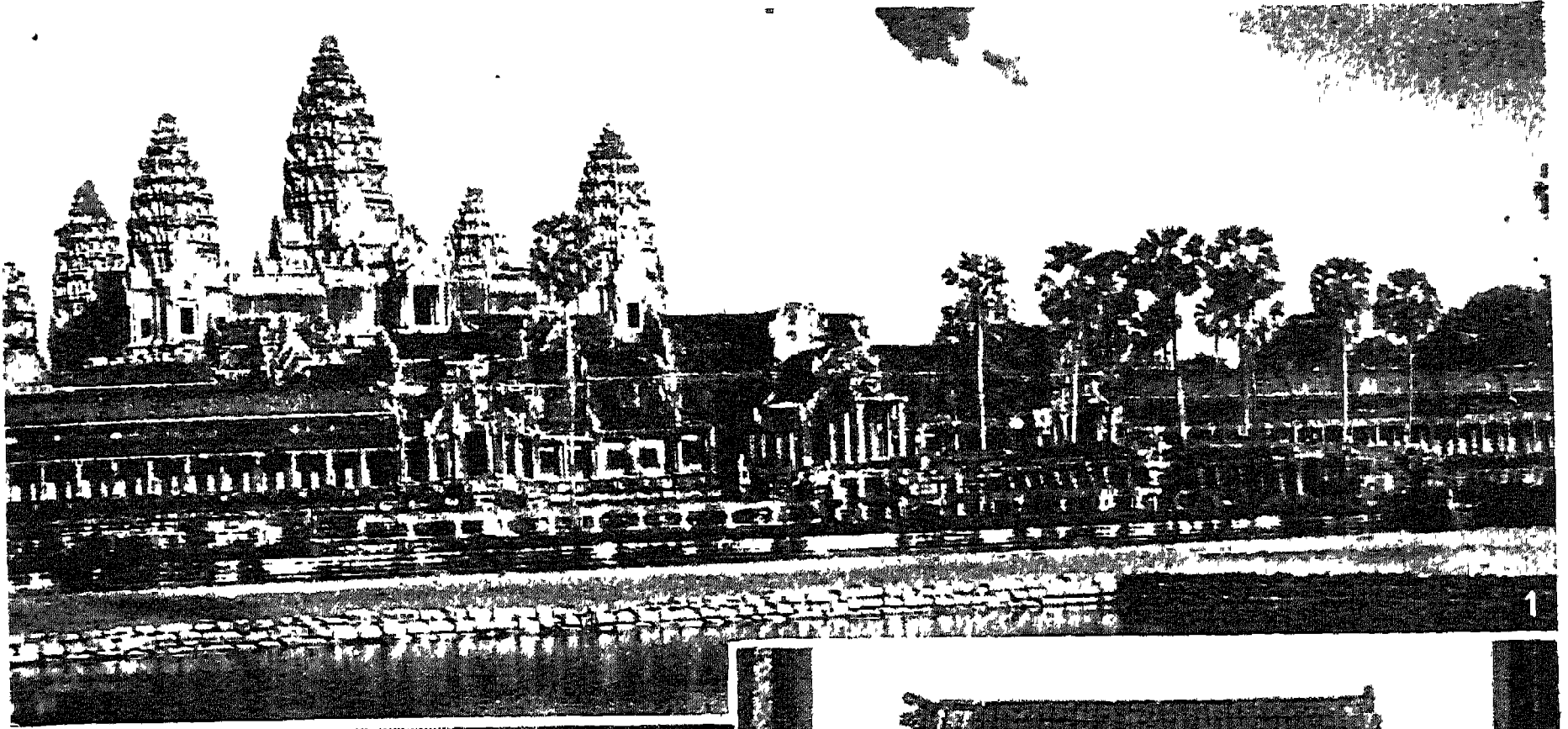
**Angevins.** A family to which eight of the English kings belonged. Henry II of England was the son of Geoffrey, count of Anjou, and he himself became count in 1151. These counts are, therefore, known as Angevins, Henry and his descendants on the English throne, of whom Richard II was the last, being often called the Angevin kings. His successor, Henry IV, also an

of Charlemagne and Bertha, he became abbot of Centula, later known as S. Riquier, in Picardy. He rebuilt the abbey and endowed it with a library. He was three times sent as envoy to the pope. He died Feb. 19, 814, and by popular and unofficial canonisation figures in the calendar of saints. It is doubtful if he is the author of a fragment of an epic dealing with Charlemagne and Leo III, attributed to him, but he probably composed portions of the Annales Laurisenses.

**Angina Pectoris** (Lat. *angina*, choking; *pectoris*, of the breast). Severe paroxysmal pain in the heart. It is not an independent disease, but a symptom of various abnormal conditions of the heart, particularly those associated with degenerative changes in the coronary arteries supplying the heart, or in the great main blood-vessel termed the aorta.

Angina pectoris is a disease of adult life, and much more frequent in men than in women. The chief causes are syphilitic disease of the arteries, gout, and diabetes, and less frequently influenza. The pain comes on suddenly, usually in consequence of muscular effort or strong emotion, such as a fit of anger. Dyspepsia and sudden exposure to cold in bathing or getting out of bed are other exciting





1. General view of the massive and profusely ornamented ruins of the temple. It was built in the early 12th century, of multi-coloured sandstone, and was used for Hindu worship before being consecrated to Buddhism.

2. A bas relief representing two devatas—one of many fine sculptures on the walls. 3. The library. 4. One of the interior courtyards, showing colonnades in the form of cloisters. The outer walls enclose 400 acres

**ANGKOR VAT: IMMENSE KHMER TEMPLE IN THE HEART OF THE CAMBODIAN JUNGLE**

for his eccentricities and extravagance. George (b. 1922), 7th marquess, succeeded 1947. An eldest son is called earl of Uxbridge, and the family seat is Plas Newydd, Anglesey. See Paget.

**Anglesey, ARTHUR ANNESLEY, EARL OF** (1614–86). English politician. Son of Sir Francis Annesley, afterwards Lord Mountnorris, he was born at Dublin, July 10, 1614, and was educated at Magdalen College, Oxford. After twice acting as parliamentary commissioner in Ireland, in 1645 and 1647, he sat for Dublin city in Richard Cromwell's parliament, 1658, and for Carmarthen borough in the Convention parliament, 1660. In 1661 he was made earl of Anglesey. He was vice-treasurer and receiver-general for Ireland 1660–7, when he became treasurer of the navy. In 1672 Anglesey was made lord privy seal, but ten years later was dismissed for criticising the Government. He exercised a moderating influence at the Restoration, and showed courage and independence in resisting the so-called popish plot in 1680. He died April 26, 1686.

**Anglesey, HENRY WILLIAM PAGET, 1ST MARQUESS OF** (1768–1854). A British soldier and statesman. He was the eldest son of the 1st earl of Uxbridge, was educated at Westminster and Christ Church, Oxford, and after sitting in the House of Commons 1790–6 and 1806–12, he succeeded his father as earl of Uxbridge in 1812.



Portrait, Sir T. Lawrence

He served in Flanders in 1794 and with marked distinction under Sir John Moore in Spain. In command of the British cavalry through the Waterloo campaign, 1815, he lost a leg in the memorable charge on June 18, and was made marquess of Anglesey. In 1828 Anglesey was appointed lord-lieutenant of Ireland, but for his support of Catholic emancipation was recalled by Wellington, to be reappointed by Grey in 1830. He left Ireland in 1833 after setting up the Board of Education. From 1846–52 he was master-general of the ordnance in the Whig ministry. He died, a field-marshal, April 29, 1854, and was buried in Lichfield cathedral. One of his sons, Lord George Paget (1818–80), was a cavalry leader in the Crimean War

**Anglesite.** Mineral found in many lead regions. A sulphate of lead ( $PbSO_4$ ), it is insoluble in water, but soluble in acids, potash, and other alkaline solutions. It occurs in a massive form of granular structure, white and rather soft, and also in the form of crystals mostly transparent and without colour, but sometimes softly coloured grey, green, blue, or yellow. Anglesite contributes something to the world's supply of lead, but it nowhere occurs in

sufficient quantities to be used by itself as a source of that metal. It gets its name from having been originally discovered in Anglesey (1832). See Lead.

**Anglican Chant.** Derivative of the Plain Song or Gregorian Chant. Its distinguishing features are (1) definite accents and note values; and (2) harmony. A single chant has two sections, of three and four bars respectively; a double chant is of the form and length of two single chants. See Gregorian Chant.

## ANGLICANISM: HISTORY & PRINCIPLES

S. C. Carpenter, M.A., D.D., formerly Dean of Exeter

*This article deals with the development of Anglicanism as a broad principle of religious belief and practice both in England and in other countries. For details of its organization in England, see Church of England*

Anglicanism is properly a temper of mind, a spirit, a thing which cannot be counted, weighed, or measured. Nevertheless, spirit in this world always takes to itself form. Accordingly, the nature of Anglicanism can be diagnosed from the history of the Church of England, and, since the Reformation, of that larger body, the Anglican Communion.

Anglicanism has existed for a long time, and has continued to flourish in the face of considerable difficulties. The difficulty at first was the pressure exercised by Rome. The difficulty since the Reformation has been the pressure of the State.

The story begins with the conversion of the English in the seventh century. That came from two quarters, from Rome and from the North West. Early English Christianity was a very fine thing. It tamed a very rough and barbarous people, it bred some great saints, and it was missionary-hearted. Moreover, it united the nation. There was one church of the English while there were still seven English kings, and there were English church synods before there was an English parliament. The weakness of the Church of England at that time was that it was isolated, especially the Northern half of it.

The Norman conquest, hard as it was for Englishmen to bear, had the salutary effect of "continentalising" the Church of England afresh. William I refused to do homage to the Pope for his kingdom, but he brought in much of the culture of the Continent. At the same time he gave the Church a considerable measure of independence by creating ecclesiastical courts side by side with

his own secular courts. Thomas Becket, taking advantage of this, stood out as a champion of the rights of the clergy against Henry II, but he was felt by the common people to be their champion too. Fifty years later, the Great Charter, which the barons, headed by the archbishop, wrung out of King John, threw the Church once more into the arms of the Papacy, but that was only because there was at that time nothing else.

From the beginning of the 13th century, especially under the weaker kings, like Henry III and Henry VI, the papal power in England increased. The stronger monarchs, like Edward I and Edward III, resisted the process. Statutes were passed forbidding appeals to Rome from the King's Court and papal nominations to English benefices. And all the time everybody protested against papal financial exactions. That was where the shoe pinched every foot. The fact is that the Church of England, remaining in communion with the Pope, and for centuries not dreaming that anything else was possible, had all the time a character of its own. It developed a good deal of the sort of thing which in the French Church was afterwards called Gallicanism. In England it was Anglicanism.

The Reformation was, among other things, an upspringing of nationalism. It was, of course, much else besides. There were theological and ecclesiastical discontents which had been brewing for centuries. The actual course of events was largely engineered by monarchs, but not even Tudor monarchs could act effectively except where there was some public



nor Puritan. It was, in fact, a new experiment in religion.

There were at the time of the Reformation two quite simple things that could be done. It was possible to pursue the old paths and to dismiss the reformers as rebels against divinely sanctioned authority. It was possible also to fling tradition to the winds and start afresh. These two courses were simple and straightforward. They were adopted in the main at Rome and at Geneva. Rome went on being papal, and Calvinism was a new church.

The Church of England adopted a policy which its enemies call compromise and its friends call comprehensiveness. It remained faithful to what it conceived to be the fundamental things, and it tried to be open-eyed towards new knowledge, to be both Catholic and Reformed.

The result is that Anglicanism, both at home and overseas, has always had a more ragged margin than is observable elsewhere. There are eager spirits who say: "Let us be definite." Others, however (and this is the characteristically Anglican position), say: "We are a part of Western Christendom, and of the whole Catholic Church, East and West. We are also Reformed. Let us therefore work for the reunion of Christendom all round. And in the meantime let us be realists. Let us remember that there are many English people who are friendly to the Christian cause, but have not yet come all the way. Let us try to meet them where they stand. Let us use the ordered beauty of our liturgy. Let us proclaim the highest possible ideal for all who are able to receive it. For those who are not yet ready, let us provide whatever they will take—street-preaching, parochial visiting, Christian Evidences in Hyde Park on Sunday afternoon, the parish magazine, schools, music, drama, the films, broadcasting, volumes of philosophy, journalism, tracts, lectures, Padres' Hours—anything that will bring men and women one step nearer God." That is Anglicanism.

*Bibliography.* A History of the English Church, ed. W. R. W. Stephens and W. Hunt, 9 vols., 1921-1935; An Introduction to the History of the Church of England, Sir H. O. Wakeman, 12th edn., 1943; The Anglican Tradition in the Life of England, A. T. P. Williams, Bishop of Winchester, 1947; History of the Church in England, J. H. R. Moorman, 1953; The Church in England, 597-1688, S. C. Carpenter, 1954.

## ANGLING: FISHING WITH ROD AND LINE

Walter M. Gallichan, Author of *The Complete Fisherman*

*General information concerning angling—what it is and how it is carried on—is given here also some particulars of the more notable branches into which the sport is divided. See also articles on Salmon Fishing; Trout Fishing; Fishing Rod; etc.*

Angling, from the A.S. *angel*, a hook, is the art of catching fish with rod, line, and hook, more particularly that branch of fishing which requires delicate manipulation of an artificial or natural bait. The term is specially used to denote the capture of fish as a sport and a means of recreation rather than as a commercial undertaking. Angling was doubtless practised with rude methods by primitive man all over the world, generally in order to obtain food, and it was certainly known to the ancient Egyptians, Greeks, and Romans.

Angling as a sport has several branches. The capture of salmon, sea trout, and river, or brown, trout with the artificial fly is considered the highest form of the art of fishing. General fish or "coarse fish," as distinguished from the "game fish" of the salmon family, are taken by bait-fishing in mid-water or on the bottom, and in the case of pike by spinning or trolling a natural or artificial lure. The principal fish now included under the category of "general," and frequenting rivers, lakes, or ponds, are pike, perch, carp, bream, tench, rudd, roach, chub, eels, and gudgeon. Barbel are only found in flowing water, and dace do not thrive, as a rule, in lakes. Chub occasionally resort to still water, but they prefer streams.

**MODERN ANGLING METHODS.** Pike are caught by spinning and live-baiting. The first mode is considered the more "sporting," provided that the bait is cast from the rod, and not trailed or trolled behind a moving boat.

### Varieties of Artificial Baits

Skill in casting a spinning bait requires much practice. The newest reels are constructed with a free running mechanism, which enables the fisherman to cast from the reel itself by a swinging movement of the rod. These reels are of various makes, and are provided with checks, which are applied when the fish is hooked. The least expensive are the Nottingham wooden reels, fitted with optional checks and line guards. Among the reliable ebonite and aluminium spinning reels are the Allcock-Aerial, the Coxon, the Britannia, and the Schooling.

The spinning baits employed in pike fishing are numerous. One of the oldest, but still popular, is

the spoon-bait of various sizes. A modified form is known as Geen's phantom spoon. Among the newest artificial baits are the Spiral, the Perfect, the Water-Witch, the Wagtail, and the Chase-Me. Some anglers use silk or rubber baits, resembling small fish, and of these there are several varieties. Light celluloid spinners are preferred by some, and the Devon minnows or Kill-Devils are popular. Pike rods are usually from 9½ ft. to 12 ft. in length. A rod of 10 ft. is useful for general pike fishing; the best kinds are made of split cane, or whole cane with lancewood or greenheart tops. The Jardine and the Ideal are useful combination rods for live-baiting or spinning. A light rod, in two joints, is the Perfect, obtainable in two lengths, 7½ ft. or 9½ ft.

### Angling for Pike and Roach

Pike lines should be fairly strong. The length should be not less than 70 yds. Traces of gut, with revolving swivels attached, must be used in spinning. For live-baiting, a single hook thrust through the lips of a small fish (dace, roach, or gudgeon) must be used, or the triangle hooks known as "snap-tackle." A length of gut of moderate stoutness, with a weight at the bottom, and fitted with a single large hook, is called a paternoster, and this is a useful tackle for pike fishing in weedy waters. With a running live-bait the snap-tackle is mostly in use, and the bait is kept about mid-water by a large cork float.

Pike are predatory fish, and will seize any kind of small prey. In spinning, a natural bait, mounted on a proper trace and hooks, is generally more alluring than an artificial bait. Live-baits must be kept fresh and lively in a bait-can. An ordinary live-bait is a dace or gudgeon of about 5 ins. or 6 ins. in length. The season for pike is from the end of September to the end of February.

Roach fishing is a very popular pastime. Most town anglers are chiefly roach specialists, and the methods of angling are becoming finer and more subtle. Some fishermen use a roach pole, a long rod made of bamboo in several joints, and angle with very fine tackle, a small hook, and bread paste, gentles, or soaked wheat as bait. Another way is Nottingham fishing, in which a 10-ft. or

(which varies) to ascend the rivers from the sea. The best sport is usually experienced when the river is clearing after a flood.

The rod is an important weapon in salmon fishing. Rods vary in length from 12 ft. to 18 ft., and are made of split cane throughout, or greenheart, and in some cases hickory and greenheart. A built cane salmon rod of good workmanship will last for years with care. The rod should be adapted to the strength of the fisherman. A long cast may be made with a 12-ft. rod, but some anglers prefer a rod of 16 ft. for big rivers. The greenheart rods are considerably heavier than those made of split cane. Reels that will serve for either fly-fishing or spinning have greatly improved in the last fifty years. They are made of aluminium, instead of the heavier brass or gun-metal, and their action is more perfect. The reel should hold at least 100 yds. of good dressed line, which may be tapered for fly-fishing. With a heavy rod a heavy line is necessary, but some split cane rods will throw a light line. For spinning, undressed flax or silk lines are preferred by many anglers. Lines for fly-fishing are of silk, dressed with a preparation to resist water. Some of these lines

soleskin phantom, or a "clipper," and a spoon-bait is often effective in lochs and discoloured rivers.

In some rivers the salmon fisherman will enjoy the best sport by wading to the lurking places of the fish. The wading outfit consists of rubber trousers, with thick socks over the feet, a pair of canvas or leather brogues studded with nails, and a short mackintosh. A steel gaff in a short handle is required for landing.

The best salmon rivers of the British Isles are in Scotland and Ireland. The Tweed, Annan, Deveron, Findhorn, Tay, Dee, Naver, and Inver are among the famous Scottish waters; in Ireland the Shannon, Erne, Bann, and Mourne. Well-known Welsh rivers are the Dee, Usk, Conway, Severn.



streams of the West and North of Ireland. Sea trout have been taken about 3 ft. in length. Fish of from 3 lb. to 5 lb. are very lusty and strong, and a sea trout of less weight is a great fighter when hooked on ordinary trout tackle. A single-handed fly-rod may be employed for sea trout. If they average a pound, fine casts are strong enough. Bright flies are in favour among sea trout anglers, and small salmon or loch flies are sometimes attached to the cast. In fine water, in summer time, small flies are best. Sea trout are variable in their feeding habits. Generally speaking, the best fishing is after a spate in the river, when the fish are fresh from the sea or estuary. The fly is worked in fishing for sea trout. Spinning often accounts for heavy baskets; large catches are made in many rivers by worm-fishing, or fly-fishing at night.

Trout fishing with the artificial fly is an art that excels all others in the sport of angling. Fly-fishing is now very popular, and its practitioners are constantly developing its tactics in order to cope with the "educated" trout of clear streams. The easiest form of fly-fishing is with a wet or sunk fly in a rough mountain brook, well stocked with free-rising fish.



Angling. Successive positions of the rod in casting for trout with a fly. Top: The beginning of the cast. Left: The fly nearing the water. Right: The end of the cast

have a breaking strain of 42 lb. dead weight, and are used for big salmon in powerful rivers.

The list of salmon flies is very large. General favourites are the Durham Ranger, Jock Scott, Wilkinson, Dusty Miller, Butcher, Silver Grey, Popham, and the Doctor. There are also special patterns tied for certain rivers. The cast for salmon fishing is made of the finest quality gut. For heavy salmon twisted gut is sometimes essential. Casts and traces for spinning should be of the finest quality. The Hercules casts can be recommended. Artificial spinning baits may be the same as those used in pike fishing. Usually salmon will take a large silver or gilt Devon minnow, a

Glaslyn, Teifi, and Towy. Favourite English rivers are the Wye, Avon (Hampshire), Eden, Dart, and Tavy. Most of the salmon fishing in the British Islands is privately owned, but lengths can be rented, and there are hotel waters on some good rivers.

SEA TROUT FISHING. The sea trout is of the salmon family, and is a migratory fish that comes into fresh water to spawn. In Ireland these fish are called white trout, in Devonshire peel, in Wales sewin, and in Scotland sea trout and herling. They afford capital sport in several rivers, notably the Devon and Cornwall streams, the Dovey and Conway in Wales, the Deveron, Findhorn, and several lochs in Scotland, and many

In the first stage the beginner should cast a short line, not longer than twice the length of the rod. The rod is grasped above the reel, and the thumb should extend along the butt. Too much wrist action must be avoided, and the cast should be made with the whole of the forearm. The line must fall lightly on the water, upstream if practicable, and the rod must be raised vertically, as the fly floats down towards the angler. The chief haunts of trout are near the ends of pools, where the current is succeeded by a broken stream or "run," in the swift shallows, and off the edge of the tumbling water. When a breeze is blowing, the pools may be fished with advantage. In the



inspired the fine work of men like C. F. Lowder (1820-80) at the London docks and R. W. R. Dolling (1851-1902) in a Portsmouth slum. At a later stage, having learnt something from F. D. Maurice (1805-72) and his associates in the Christian Socialism of 1848-54, the Anglo-Catholics added social action to individual devotion. They were strongly active in the Guild of S. Matthew, the Christian Social Union, and the Church Socialist League.

In matters of liturgical practice and social action the Anglo-Catholic contribution to the life of the Church has tended to become less distinctive as much of it has been appropriated by the whole Church. It is in the realm of doctrine that the Anglo-Catholic position remains well defined. The two focal points of doctrine, as understood by the Anglo-Catholic, are the ministry and the sacraments: the three-fold ministry of bishops, priests, and deacons, as an essential gift of Christ to his Church, and the sacraments, rightly administered, as objective moments of divine action. It follows that the Anglo-Catholic position becomes most clearly defined in discussion and action concerned with the reunion of different Christian denominations.

Anglo-Catholicism stimulated the reading of devotional literature, both by making more widely known some of the classics of Catholic spirituality, and by the original contributions of writers such as John Keble, whose *Christian Year* passed through 95 editions in his lifetime; John Mason Neale (1818-66), the hymn-writer; and Evelyn Underhill (1875-1941). The spiritual discipline of the Church was strengthened both by the revival of religious life under vows and by the promotion of retreats and quiet days for clergy and laity. The best known religious societies of the Church which have resulted from the Catholic revival are the Society of S. John the Evangelist (often called the Cowley Fathers); the Community of the Resurrection at Mirfield; the Society of the Sacred Mission at Kelham (Notts); the Society of S. Francis; and, for women, the Community of S. Mary the Virgin (the Wantage Sisters).

The principal organs which gave expression to Anglo-Catholic thought were the English Church Union, founded in 1859, and the Anglo-Catholic Congress, first held in 1920, subsequently amalgamated as the Church Union, which gave rise in 1951 to the Anglo-Catholic

Progress. Consult *The Anglican Revival*, Y. Brilioth, 1925; *The History of the Anglo-Catholic Revival from 1845*, W. J. Sparrow Simpson, 1932; *The Catholic Movement in the Church of England*, W. L. Know, 1932.

**Anglo-Egyptian Sudan.** Name given during 1899-1952 to a territory of Africa lying to the S. of Egypt and including most of the Nile valley which in 1956 was proclaimed the republic of Sudan (*q.v.*). Following the Sudan campaign of 1896-98 (*see below*), it was administered jointly from 1899 as a condominium by the U.K. and Egypt. In 1948 a legislative assembly and executive council were inaugurated, first elections favouring the Independence party. Egypt, which had long demanded integration of Sudan with itself, in 1952 abrogated the condominium unilaterally and Farouk was proclaimed king of Sudan. After his abdication, fresh negotiations resulted in 1953 in the signing of an agreement establishing self-government in Sudan with a promise of full self-determination in three years. The first Sudanese parliament, opened on Jan. 1, 1954, in 1955 chose complete independence, and on Jan. 1, 1956, the country was proclaimed an independent, democratic republic.

**SUDAN CAMPAIGN, 1896-98.** After the fall of Khartum in 1885 (*see Gordon, C. G.*), Sudan remained virtually independent, and the able Khalifa Abdullah built up an army which fought a victorious war with Abyssinia, 1887-89. In 1892 Kitchener was appointed sirdar (c.-in-c.) of the Egyptian army which had meantime been re-organized and trained by the British; and in March, 1896, partly to offset the Italian defeat at Adowa (*q.v.*), partly to discourage French aspirations on the Upper Nile, he was ordered to lead an expeditionary force against the khalifa's "dervishes." A 750-m. line of communications by rly., river, and camel transport was rapidly organized from Cairo to Wadi Halfa. Firket, a few miles S. of Kosha, was captured on June 7. Delays followed owing to an outbreak of cholera, and the necessity of awaiting the Nile flood so that the steamers and gunboats supporting the land forces could negotiate the 2nd cataract.

When the expeditionary force of 15,000 men, 36 guns, and 8 warcraft resumed its advance by land and water on Sept. 12, it encountered only light resistance, the dervishes declining a general en-

agement; and Kitchener occupied Dongola on Sept. 23. In Dec. he was ordered to continue the advance up the Nile. A rly. was thrown 220 m. across the desert from Wadi Halfa to Abu Hamed, from which the dervishes were expelled Aug. 7, 1897, by a flying column from Merowe; a gunboat flotilla reached Abu Hamed on Aug. 29. Land and river forces then pushed on together and occupied Berber, Sept. 5.

The Egyptian army, reinforced by a British brigade, was concentrated in Feb., 1898, between Berber and the junction of the Nile and the Atbara. In March, the Emir Mahmud, sent by the khalifa to hold Metemmeh, left that town and cut N.E. across the desert in a bold attempt to outflank the Anglo-Egyptian force and retake Berber. Kitchener shattered his force of 12,000 in the decisive battle of the Atbara (*q.v.*), April 8.

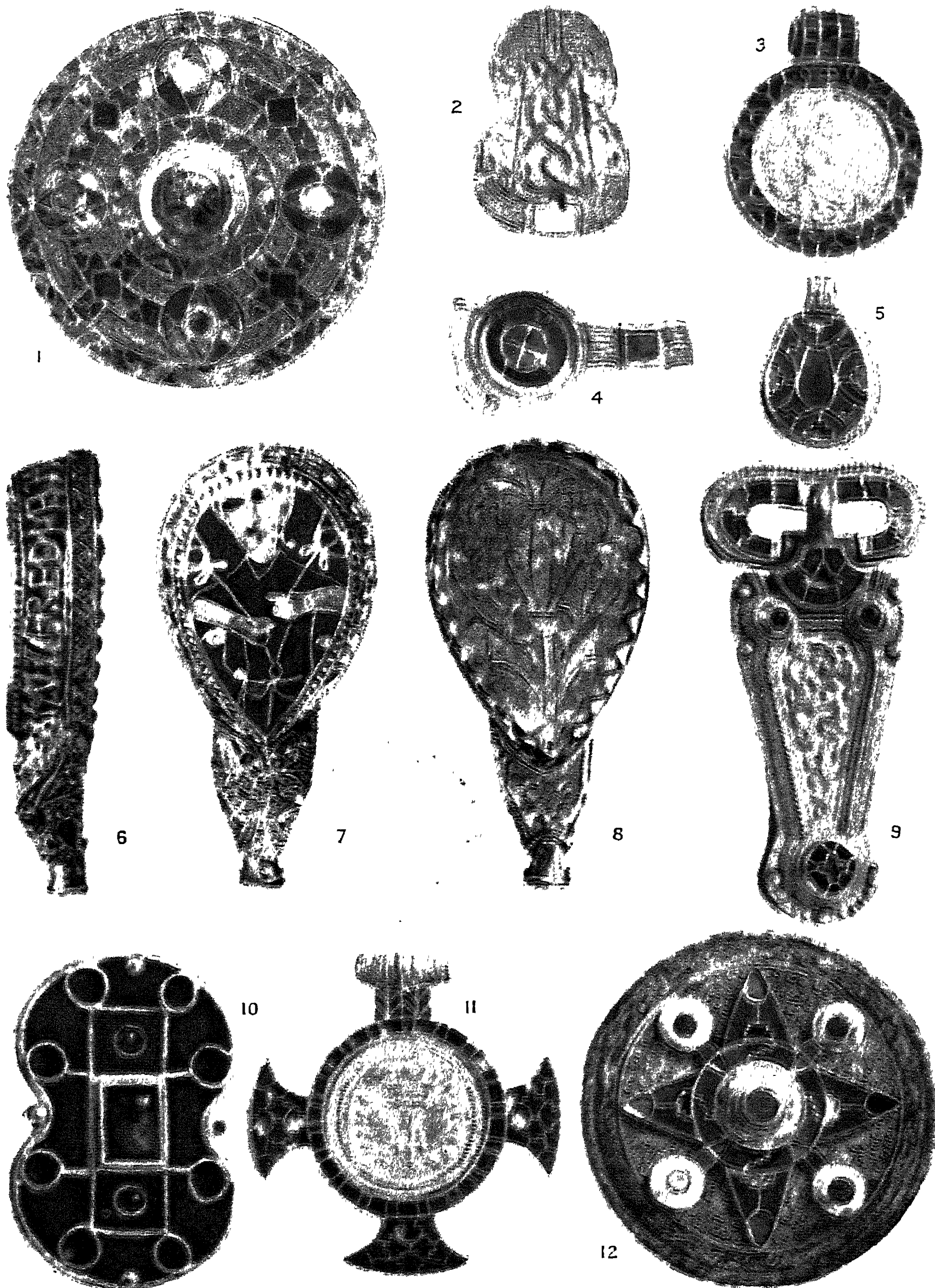
The final thrust to Omdurman, the dervish capital, began towards the end of Aug. The dervish host, deployed on the plains of Kerreri before Omdurman, was sighted on Sept. 1, and at 6.45 a.m. next day the battle began (*see Omdurman, Battle of*); five hours later the dervish army had gone down in utter defeat. *See also* Khalifa: consult *The River War*, Winston S. Churchill, 1899; *Khartum Campaign, 1898*, B. Burleigh, 1899.

**Anglo-Iranian** (OR **ANGLO-PERSIAN**) OIL COMPANY. *See* British Petroleum Company.

**Anglo-Saxon** LANGUAGE AND LITERATURE. *See under* English Language and Literature.

**Anglo-Saxon Antiquities.** The earliest remains of Anglo-Saxon material culture on English soil are grave goods. In the pagan period both cremation and inhumation were practised. The cinerary urns are usually globular or biconical pots, sometimes ornamented with heavy knobs. Parallels to them occur in the invaders' homelands along the German coast from Schleswig to the Weser. Other kinds of pottery are found, also bronze vessels and imported glass and the bronze fittings of wooden buckets. The warriors used spears, long swords, and small round wooden shields with iron bosses, which are sometimes decorated. The Frankish cutlass-like scramasax is found from the 7th century. Combs, girdle-ornaments, bead necklaces, brooches also are found.

There are a number of well-marked brooch types, such as the early cruciform brooch, and the square-headed, equal-armed, and



1. Inlaid brooch from Kingston, Kent. 2, 4, and 5. Jewels from the King's Field, Faversham, Kent. 3. Roman coin of Valentinian II used as a pendant: from Staffordshire. 6, 7, 8. Side, front, and back of the Alfred Jewel (*see entry*), actual size: the figure of Christ in cloisonné enamel, mount and inscription of gold. The

Alfred who ordered it is believed to be Alfred the Great. It was found near Athelney Abbey, Somerset, in 1693. 9. Gold buckle of Kentish type set with garnets and lapis-lazuli: from Taplow barrow. 10. Jewel from Kent. 11. Byzantine coin of Heraclius I, mounted as a pendant: from Norfolk. 12. Inlaid brooch: from Wingham, Kent.

#### ANGLO-SAXON ANTIQUITIES A GROUP OF JEWELS FOUND IN ENGLAND

1, Liverpool Museum; 6-8, Ashmolean Museum, Oxford; rest, British Museum





Roads total more than 23,000 miles; and there are regular air services to the Belgian Congo and Europe from Luanda.

**Angoniland.** A plateau of east central Africa. It lies to the S.W. of Lake Nyasa, has a mean elevation of 4,000 ft., and is inhabited by the Angoni, who were formerly members of the Zulu confederation. Central Angoniland forms a part of the British protectorate of Nyasaland. Area 5,884 sq. m.

**Angora.** Variant transliteration, commonly used in English for the city of Asia Minor usually spelt Ankara (*q.v.*) after it became the capital of Turkey in 1923.

**Angora Goat** (*Capra ongorensis*). Long-haired breed of Asiatic goat, originally from Tibet. Angora wool and mohair are produced from these goats, which are covered with ringlets of soft silky hair.

**Angora Rabbit.** The only long-tailed variety of rabbit. It is believed to have originated in Asia Minor and Persia, and was first brought to Great Britain as an exhibition pet about 1850. White is the most popular colour as the coat does not as a rule grow so long in the other colours—golden, fawn, blue, smoke, and grey. A fine specimen should weigh about 6 lb., and have a fleecy coat over the whole body, short and erect ears with hanging tufts at their tips, deep bright pink eyes, straight and heavily woolly legs and tail. The Angora rabbit yields about 10 oz. of wool annually. This wool, which is very soft, warm, and light, is obtained by several clippings; some 6 oz. will be best wool—about 3 ins. long; the remainder is shorter and of lower quality. Fluff readily detaches itself from Angora wool, which should therefore not be used for knitting infants' clothing.

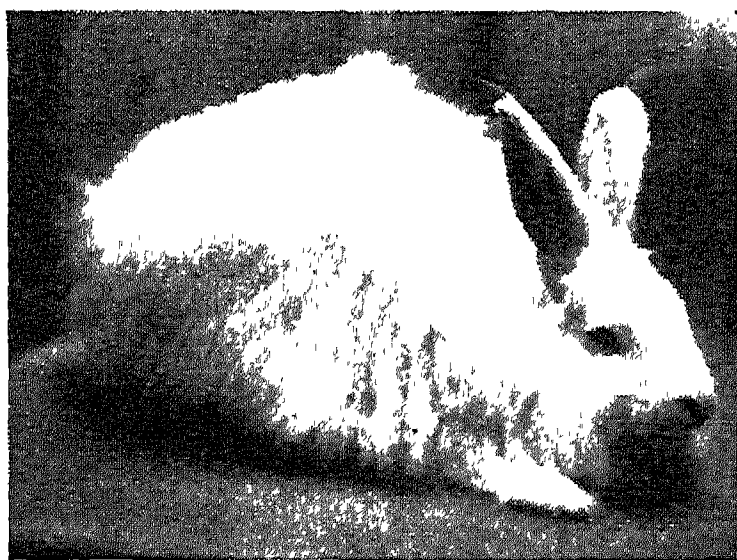
**Angostura Bark.** Bark of small trees (*Galipea officinalis* and *Cusparia febrifuga*), native to tropical America, and included in the family Rutaceae. It yields a stimulant tonic, which has been used in place of cinchona (quinine) in treating fever. The tonic called Angostura Bitters is an essence containing angostura bark together with various aromatics.

**Angoulême.** City of France, capital of the department of Charente. Between the slow running Charente and its tributary the Anguienne, it is 83 m. N. by E. of Bordeaux on the rly. to Poitiers. The ancient Ecolisma, built on a nar-

row calcareous platform easy to fortify, it was often a refuge for Gallo-Romans flying before barbarian invasions. The position of the town later proved a drawback: when roads were made in the 18th century, they had to wind round the town; and when railways were built, in the 19th, two tunnels had to be constructed.

Angoulême has long been an active market town, with paper mills (already flourishing in the 16th century), national artillery works at Ruelle 4 m. away, a national gunpowder factory, a cement works, and brandy distilleries. It is the seat of a bishopric. The cathedral of S. Peter, built in the 11th and 12th centuries, is a fine piece of romanesque architecture, repaired in the 19th century in 13th-century style. A promenade occupies the site of the old ramparts. Pop (1954) 43,170.

In 1179 Richard Coeur de Lion stormed the town. Calvin lived



Angora Rabbit. Only long-tailed rabbit, valued for its soft, fine wool

long in Angoulême, which was the scene of fighting between Huguenot and Roman Catholic. Before it passed to the crown it was governed by counts, and in the 16th century Francis I made it into a dukedom. It was the birthplace of Margaret, sister of Francis I (*see* Margaret of Angoulême), through whom Henry of Navarre succeeded to the French crown as Henry IV, and of Guez de Balzac, the 17th-century writer.

**Angoulême, LOUIS ANTOINE, DUKE OF** (1775–1844). French prince and soldier, last dauphin of France. The eldest son of Charles Philippe, count of Artois, later Charles X of France, he was born at Versailles, Aug. 6, 1775. He left France at the outbreak of the Revolution and after some military service lived in exile. In 1799 he married his cousin Maria Theresa, daughter of Louis XVI. During the Hundred Days he unsuccessfully opposed Napoleon, and in 1823 was in command of the French

expedition in Spain. He joined his father in exile, signing an abdication of the throne in 1830, and died at Görz (Gorizia), June 3, 1844.

**Angoxa, ANGOSTA, OR AN-GOCHE.** A coast district and small town on the Angoxa river, in Mozambique. Sometimes called by the Portuguese Antonio Enes, the seaport, 60 m. S.W. of Mozambique town, is accessible by small steamers and has a trade in copra and groundnuts. The dist. has a coastline 90 m. long. Products include cotton, cocoa, groundnuts, oilseeds, and ivory.

**Angra do Heroismo** (Port., bay of heroism). Fortified seaport and largest town of Terceira Island in the Azores, capital of one of the three administrative districts into which the islands are divided. It stands on the S. coast of Terceira Island, and exports wine, cereals, and fruit. Pop. (1950) 12,465.

**Angra Pequena.** Name given by the Portuguese to the harbour of South-West Africa better known as Lüderitz Bay (*q.v.*).

**Angriff, DER** (German, the attack). Daily Berlin evening newspaper of the National Socialist party. Created by Josef Goebbels (*q.v.*), 1928, originally appearing twice weekly, it soon became the first Nazi daily of the German capital, with a circulation of over 100,000. It established Goebbels as a propagandist. He ceased to edit the paper officially when the Nazis came to power in 1933, but he remained its undisputed master and used it to serve his own political ends until it ceased publication. Feb., 1945.

**Angstrom.** Very small unit of length, used chiefly in measuring optical wavelengths, and distances between atoms in crystal lattices. It is equal to one ten-millionth of a millimetre ( $10^{-8}$  cm.), and is named after the Swedish physicist A. J. Ångström.

**Ångström, ANDERS JONAS** (1814–74). Swedish physicist who made many contributions to scientific knowledge; the unit of measurement of optical wavelengths was named an angstrom in his honour. Born Aug. 13, 1814, he was educated at Uppsala university and in due course became keeper of the observatory and professor of physics there. His life was devoted to the study of heat, magnetism, and spectroscopy. He died at Uppsala, June 21, 1874.

His son, Knut Johann Ångström (1857–1910), also became famous as a physicist and as an inventor of scientific instruments.



**Anhydrides** (Greek *an-*, not; *hydōr*, water). Oxides which react with water to form acids, or are obtained from acids by withdrawing water. Acid anhydrides are the acid radicals remaining after abstracting water from the acid. Sulphuric acid ( $\text{H}_2\text{SO}_4$ ), with water ( $\text{H}_2\text{O}$ ) abstracted, leaves sulphuric anhydride ( $\text{SO}_3$ ). Similarly, the anhydride of an organic body is the substance obtained from it by the elimination of water.

**Anhydrite.** Natural anhydrous sulphate of calcium. It occurs like gypsum in beds and nodules, usually in association with red sediments and salt-deposits, such as those of the Trias, which indicate arid climatic conditions. Formerly little used, anhydrite now enters into the manufacture of sulphate of ammonia for use as a fertiliser.

**Ani.** Ruined city in the Turkish vilayet of Kars, about 25 m. E. of Kars city. In the 10th century capital of the Bagratide kings of Armenia, during the following three centuries it suffered frequent siege by Turks, Georgians, and Moguls. Noted for its numerous churches, it was destroyed by earthquakes.

**Ani, PAPYRUS OF.** Finest extant example, 78 ft. long, of the Egyp-

tian Book of the Dead, made in honour of a Theban scribe Ani about 1500 B.C. Its magnificently coloured vignettes, now in the British Museum, depict the ceremonial at an Egyptian funeral. A papyrus in Cairo Museum contains the paternal precepts of another scribe Ani of about 600 B.C. See Book of the Dead.

**Anie, Pic d'. A** peak of the Pyrenees in France. It is a sacred mountain of the Basques, and is 8,215 ft. high.

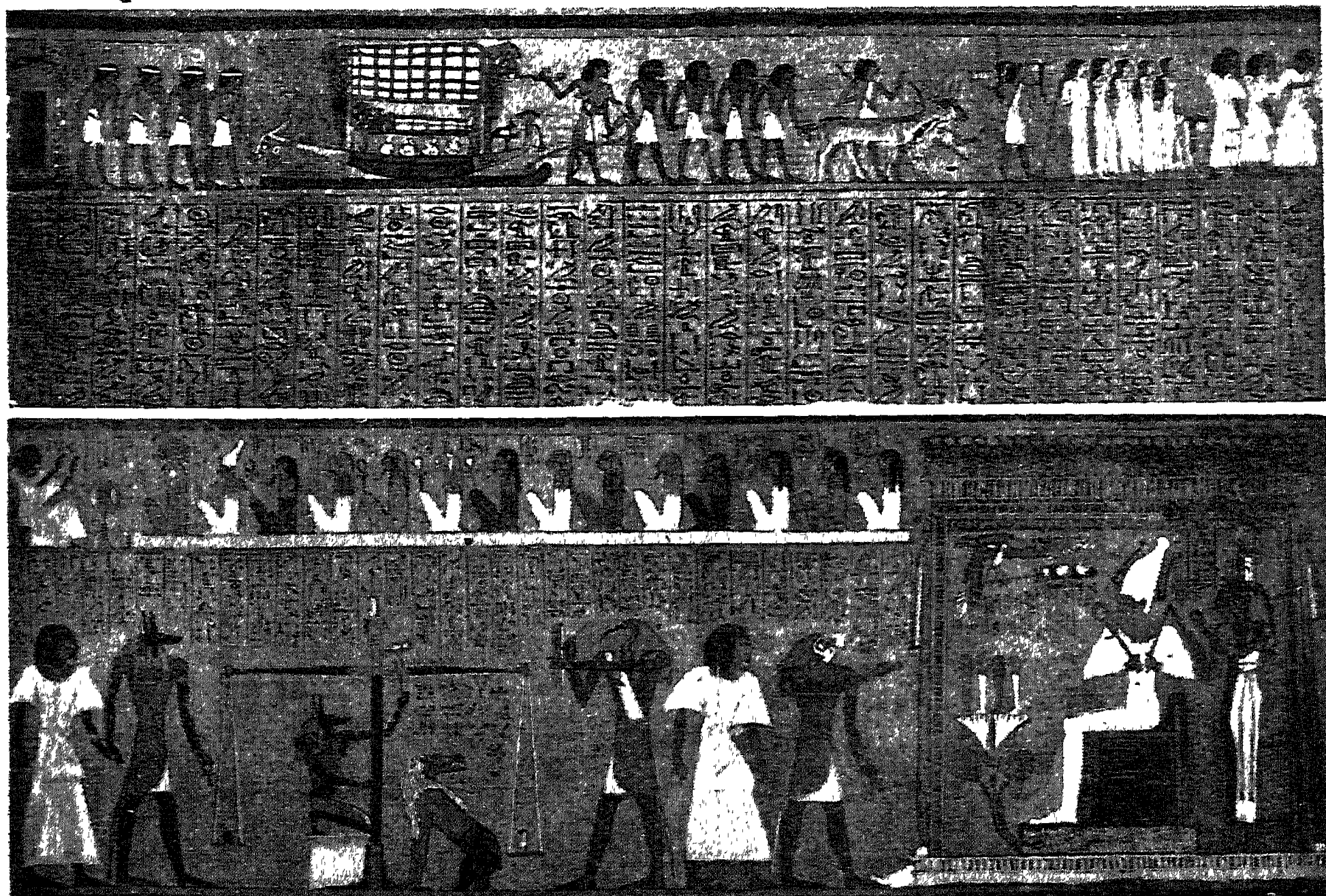
**Aniene** (Lat. *Anio*). River of central Italy. A tributary of the Tiber, which it enters 2 m. above Rome, it rises in the Hernician Hills and flows W. past Tivoli, where it forms famous falls. It is about 70 m. long. Called also the Teverone, or Little Tiber, it has supplied Rome since ancient times with water. Installations at Castel Madama produce electricity for Rome.

**Aniline** (Arab. *annīl*, indigo) ( $\text{C}_6\text{H}_5\text{NH}_2$ ). Organic chemical compound, the starting point of many synthetic dyes and of a very wide range of drugs, plastics, and aromatic chemicals. Discovered in 1826 in Germany amongst the products of the destructive distillation of indigo, it later proved to be obtainable by the reduction of nitrobenzene with hydrogen sul-

phide. In 1856 W. H. Perkin, who was trying to synthesise quinine, obtained, by the oxidation of aniline with potassium dichromate, a black precipitate from which he isolated a small amount of a purple dye. A dyeing establishment found it promising, and Perkin undertook its commercial preparation by the nitration of benzene to nitrobenzene and its subsequent reduction to aniline. An excellent method for the reduction of nitrobenzene with iron and acetic acid had just been discovered and mauveine, the first synthetic dye, was on the market in 1857. This dye, used for the Victorian violet penny stamp, was a mordant dye to cotton and silk; its structure was solved by O. Fischer in 1890. Except for safranine T, few dyes of this type have continued in use.

Aniline is the starting point for many triphenylmethane dyes. The first of these to be discovered was fuchsin (rosaniline), by Verquin in 1859; they include crystal violet, malachite green, and the patent blues. Aniline is also used for the manufacture of other types of dyes, e.g. naphthol blue black B, and other azo dyes, and for the manufacture of intermediates for many other more complex dyes.

A few dyes are produced in the fibre by the oxidation of



**Ani.** Portions of the magnificent papyrus made in honour of the Theban scribe Ani about 1500 B.C. This papyrus is the finest known example of the Egyptian Book of the Dead. The upper part shows a funeral procession, and the lower the weighing of the soul before the judgement seat. The original is in the British Museum

a bird, is classified with the mammals because its mammalian characters of hair, teeth, giving birth to live young and suckling them, show that it had a common ancestor with other mammals much more recently than it had one with the birds. The species in a genus will have a very large number of characters in common, whereas in a higher class category the number of characters in common will decrease. Thus the leopard and the tiger are two species in the same genus; the cheetah and the lynx belong to different genera in the same family as the leopard and the tiger; bears and weasels belong to different families in the same order; man and whales belong to different orders in the same class; and birds, frogs, and fish to different classes in the same phylum.

The kingdom contains three sub-kingdoms, the members of each of which are so unlike the members of the others that they have no more than the character of all animals in common. The sub-kingdom Protozoa, with only one phylum of the same name, contains all those animals whose body consists of a single mass of protoplasm not further divided into cells. They are very small, many being invisible to the unaided eye, and live in water or as parasites. The sub-kingdom Parazoa contains only the phylum Porifera; these are the sponges, many-celled organisms which produce a complex skeleton but with very little differentiation of cells into organs or tissues. All other animals are included in the sub-kingdom Metazoa, which is characterised by the division of the body into at least two, usually three, layers of cells during development and by a much greater differentiation of cells into tissues and organs serving different functions.

#### Status of a Phylum

There are numerous phyla in the sub-kingdom Metazoa, and there is, as regards some, no general agreement as to what groups should or should not have the status of a phylum. The line is usually drawn at a point where it is not possible to see any certain relationships between the animals

in any one group and those in any other, or where, even though their relationships with other phyla are certain, the living species form a compact group which differs very widely in general structure from their nearest relatives. Phyla are thus very unequal in the number of species they contain; the Priapulida contain only four species, but they stand compactly so far apart from all others that they

fish are vertebrates, even though both belong to the same phylum, the Chordata.

The table shows the principal phyla of the animal kingdom. The figures give the approximate number of living species in each phylum. The total number of species is about 1,150,000.

**Animal Locomotion.** Ways in which animals move about. These can be divided into swim-

ming, creeping, running, and flying. The density of swimming animals is roughly the same as that of water, so that they need only produce a force to drive themselves forward. This they do by projecting backwards some of the water which surrounds them. Very small animals (e.g. *Paramecium*) often do this by means of cilia, minute hairlike projections of the surface which beat like oars. The volume of water moved by cilia is small, and larger swimming animals use their muscles in locomotion. The crustacea row themselves along by their jointed limbs, which are often flattened, or fringed with bristles. True jet propulsion is not uncommon in aquatic animals. The salps are small barrel-shaped animals, with an opening at the

PRINCIPAL PHyla OF THE ANIMAL KINGDOM

Phylum	Species	Description
Protozoa	30,000	Single-celled organisms such as <i>Amoeba</i> and <i>Paramecium</i>
Porifera	4,500	Sponges
Coelenterata	9,000	Sea anemones, jelly fish, corals
Ctenophora	90	Sea gooseberries
Platyhelminthes	6,000	Flat worms, flukes, tapeworms
Acanthocephala	300	Thorny-headed worms
Rotifera	1,500	Wheel-animalcules
Nematomorpha	100	Hair worms
Nematoda	10,000	Round worms
Nemertina	750	Ribbon worms
Annelida	7,000	Bag worms, earth-worms, leeches
Echiuroidea	60	Sack-like worms
Sipunculoidea	250	Sausage-like worms
Arthropoda	925,000	Crustaceans, centipedes, millipedes, insects, spiders, mites, scorpions
Mollusca	80,000	Snails, bivalves, cuttle-fish, octopus
Ectoprocta	3,300	Sea mats
Brachiopoda	250	Lamp shells
Echinodermata	4,000	Starfish, sea urchins
Chaetognatha	30	Arrow worms
Chordata	39,500	Sea squirts, fish, amphibians, reptiles, birds, mammals

(After E. Mayr, et. all. *Systematic Zoology*. 1953)

must have this status. The Arthropoda, although they contain 90 p.c. of all described species, are clearly of common stock. Nevertheless some general indication of the lines along which evolution has taken place can be seen, although these are not expressed as class categories. Four main lines are probable: the Platyhelminthes are perhaps related to the Coelenterata and Ctenophora; the Nematoda, Nematomorpha, Rotifera, and Acanthocephala go together; Annelida, Arthropoda, and Mollusca form the third stock; and the Chordata have affinities with the Echinodermata, the Chaetognatha, and perhaps the Brachiopoda.

It is customary to divide the animal kingdom into Vertebrata, containing all those that have a vertebral column, i.e. fish, amphibians, reptiles, birds, and mammals; and Invertebrata, containing the rest. This division is convenient, but it both obscures the true relationships and suggests false relationships. For example, the sea-squirts are invertebrates and the

front and at the back, and rings of muscle like the hoops of a barrel. Water is drawn in at the front, and driven out backwards by contractions of the muscles. In jelly-fish there is a single opening through which water is drawn in and expelled, so that they progress in a series of jerks. The same is true of cephalopods, of which the cuttle-fish, the squid, and the octopus are examples. In the cephalopods the jet emerges by a funnel which can be pointed forwards or backwards, enabling them to progress rapidly backwards or forwards.

Most fish swim by throwing the body into a series of lateral S-shaped curves, which travel backwards along the body, thus driving backwards the water surrounding them. The main driving force usually comes from the tail fin, which is flattened in a vertical plane, while the other fins are used for steering and braking.

Other animals creep over the surface, either under water or on moist ground. *Amoeba* creeps



being alive. Later on he would draw from the observed facts of dreams and of unconsciousness, visible breath and ill-health, reflected images in water and shadows, the notion of a spirit-self—it might be more than one—separable from the body. This recognition of the human soul and its extension to all other sensible objects are the material of what E. B. Tylor, taking over the term from G. E. Stahl, who used it of vitalism, called animism.

By the side of the belief in human personality there emerged another, not necessarily as an inference—the belief in an after-life of the soul, for a time at least. The spirit or breath of the dead became a ghost, the shadow of the dead a shade. That this was perceived by early palaeolithic man in Europe is attested by the careful interment of the dead, and the provision of choice amulets and tools for their ghostly service. From this point animism as an effort of the mind began to influence the emotional life. While, therefore, the primitive religions may not be the direct offspring of animism, they arose at any rate in an animistic atmosphere. The lines of development follow a threefold path, deducible from the foregoing. (1) The soul's after-life suggested the cult or tendance of the dead, which became the worship of disembodied spirits credited with objective powers. (2) The contemplation of the power manifest in phenomena resulted, not necessarily later in time, in nature-worship. (3) The conception of bodiless spirits led to devices for their propitiation, which widened into spirit-worship.

To the savage mind a spirit may be a thing of mystery, but not an abstraction, as when the natives of Danger Island, in the Indian Ocean, employ rope nooses as traps for errant souls. Moreover, not all spirits are traceable to a material home, while many are conceived as able to enter at will different kinds of bodies, human, animal, or inanimate. They are thus often creatures of the imagination rather than objective ghosts, and by association of ideas are regarded as controllable by the principle of similarity. Out of the one grew the primitive belief in transmigration; out of the other, sympathetic magic. This brought about the separation of a special class of men, often exercising psychic powers more or less consciously, who as medicine-men or witch-doctors practise the arts which culminate in shamanism. So also

the individual attitude towards a subservient spirit or tutelary genius diverged in Africa into fetishism, and in Australia and Polynesia is illustrated by ideas connoted respectively by the *churinga* and *mana* (*q.v.*).

Through these primal beliefs runs the idea of communion with a friendly, or at least a placable, unseen world. Some have held that a still more primitive movement of the mind was instigated by fear. When all was well, human nature may in all ages, as to-day, have been content with the unthinking acceptance of the material life; when calamity befell, such thoughts began to emerge as led to propitiation by sacrifice. This involves the consideration how far the "god-idea" may have arisen independently of the "spirit-idea." While it cannot be asserted that the conception of a Supreme Being is



Anise. The star anise from which much of the oil used in medicine and for flavouring is obtained

inherent in all savage minds, some interesting conclusions are deducible from the aboriginal beliefs of the Australians, Bushmen, and Fuegians, who represent at the southern extremities of the continental masses the still lingering relics of earliest man. We are on surer ground when considering the clear distinction made in early ages between good and evil spirits. The effort to avert the malevolence of malignant spirits as the producers of disease, either through demon-possession or hostile witchcraft, led to exorcism.

There is little, if any, moral element in animism. The belief that the after-life is determined by the ethical acts of the present belongs to a higher stage. Among animistic peoples ethics is essentially obedience to tribal law. It was after religion had come to exert a more peremptory hold on the attitude of the individual

soul that to customary law it added sanctions based upon the fear of subsequent retribution, or the expectation of ultimate reward. The great non-Christian theisms have offered the world lofty philosophies, but their votaries still for the most part maintain in time of calamity their primal animism. Thus while Australia and Polynesia, Melanesia and non-Moslem Africa may be classed in general terms as animistic, the mongoloid peoples of Eastern Asia maintain ancestor-worship as their operative religion. Even Hinduism itself, polytheistic though it be in form, is at heart a highly systematised animism. See Anthropology; Spiritualism.

E. G. Harmer

*Bibliography.* Golden Bough, J. G. Frazer, 1890; Origin and growth of the Conception of God, E. Goblet d'Alviella, 1892; Myth, Ritual and Religion, A. Lang, new ed., 1899; Threshold of Religion, R. R. Marett, 2nd ed. rev. 1914.

**Anio.** Classical name of the Aniene (*q.v.*), a river of central Italy. It supplied ancient Rome with water by two aqueducts.

**Anion** (Gr. *ana*, up; *ion*, going). A negatively charged ion in solution. It is so called because in electrolysis it is attracted towards the anode, or positive terminal. The name was first used by Faraday. A positively charged ion attracted to the cathode, or negative terminal, is called a cation.

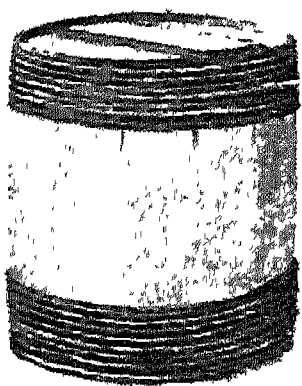
**Anise** (*Pimpinella anisum*). Perennial herb belonging to the widespread family Umbelliferae. Anise is a native of Greece and other parts of S. Europe. It has leaves cut into lobed or toothed leaflets, and minute white flowers; as with all umbelliferous plants, the little fruits are pierced with tubes filled with an aromatic essential oil. The fruits, the aniseed of commerce, are used as a flavouring in confectionery, and the oil extracted is used in medicine as a remedy for flatulence and dyspepsia. Much of the commercial oil of anise is obtained from the fruits of star anise (*Illicium verum*), an evergreen shrub of the family Magnoliaceae and a native of China and Japan.

**Anisic Aldehyde.** Synthetic substance much used in perfumery. It smells of hawthorn blossom.

**Anjengo.** Village in the state of Travancore-Cochin, India. On the coast, 78 m. N.W. of Cape Comorin, it was one of the earlier English settlements in India, being occupied by the East India Company in 1684. Although within the former princely state of Travancore, it was British until 1947.

Latin Crusaders, the city fell to the Ottoman Turks in 1360. Tamerlane the Tartar defeated and imprisoned the sultan Bayazid near here in 1402, but Mohammed I recovered the place in 1415, since when it has remained Turkish. In 1832 it was momentarily seized by Egyptians under Ibrahim Pasha. The Turkish nationalist movement chose it for headquarters in April, 1920. Shocks were felt here during the great earthquake to the E., Dec. 27-28, 1939, and it was here that relief measures were organized.

**Anker.** Old Dutch measure of liquid capacity. Formerly used in England, when it contained ten gallons of wine, it is still used in S. Africa, equalling 7½ gallons.



**Anker.** Old Dutch liquid measure

a student of theology and law, but was attracted by the stage and worked his way as an actor for eight years, eventually holding the post of stage director in various theatres. With this career he combined journalism and a considerable output of plays and novels. He won the Gyldendal prize for literature with his *De Vises Sten* (The Philosopher's Stone) in 1923. Other translated works include *Martha and Mary*, *With the Door Open*, and *A Stranger in Paradise*.

**Ankh.** Ancient Egyptian symbol of life. The object depicted is a sandal-string, the name for which in ancient Egyptian had the same sound as the word for life, and was adopted as the hieroglyphic for life, to live, etc. It was a favourite amulet, and is often shown in the hands of the gods. By local association it became among the early Coptic Christians the sign of the cross.



**Anklam.** Town of New Brandenburg dist., E. Germany, on the Peene, 5 m. from the Baltic and 52 m. by rly. N.W. of Stettin. It has a military academy, some shipping trade, and shipbuilding, linen, woollen, and sugar industries. An old town, it has a church dating from the 12th century. Formerly an important fortress, it belonged to the Hanseatic League and later to Sweden, passing to Prussia in 1720. Pop. (est.) 15,000.

**Ankle.** A hinge joint of the human body, scientifically known as ginglymus. The articulation takes place between the two bones of the leg, the tibia and fibula,



**Ankle.** An indication of the way in which its bones connect the foot with the leg

which are firmly united at their lower ends by ligaments, and the upper surface of the astragalus or ankle bone. It is a joint of very great strength owing to the ligaments which surround it and the close interlocking of the bony surfaces, the ends of the leg bones being prolonged down on each side to form a hollow resembling a mortice into which the astragalus fits.

Injuries of the ankle are sprain, dislocation, and fracture of the bones forming the joint. Sprain is usually due to twisting or wrenching the foot in a fall or "stepping over," and is accompanied by pain and swelling of the joint and sometimes discoloration of the skin if the blood-vessels have been injured. The treatment is to apply cooling lotions for a few days while the symptoms are acute and to keep the foot at rest, but as soon as the pain and swelling have sufficiently subsided gentle massage should be begun and movements of the joint made in order to prevent adhesions being formed and permanent stiffness resulting. Dislocation of the ankle joint is frequently associated with fracture of the lower ends of the bones of the leg owing to the close interlocking of the various bones. Fracture is particularly likely to occur with lateral dislocations. Backward dislocation of the astragalus usually results from a fall on the feet while running or jumping, or sudden violence applied to the leg while the foot is fixed, and may be associated with fracture of both bones of the leg. Dislocation forwards is very uncommon. Fracture dislocation of the ankle necessitates skilled surgical treatment.

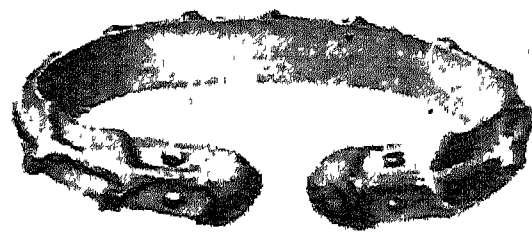


**Anklet.** Foot of an Indian princess, illustrating use of anklets

Disease of the ankle is most frequently tuberculous, a pulpy swelling gradually involving the whole region of the joint, with impairment and eventually loss of movement of the foot. The treatment is to give the joint complete rest for a prolonged period either by the application of splints or, and often preferably, by encasing it in plaster of Paris; simultaneously antibiotics should be administered, and the general constitution of the patient should be built up. Surgical treatment may be adopted in appropriate cases.

**Ankleswar.** Town of Bombay state, India. It is 5 m. by rly. S. of Broach and has cotton and paper mills.

**Anklet.** A ring worn upon the ankle as a bracelet is on the wrist. It is specially in favour with the



**Anklet.** 1. Of brass, worn by women of Torres Straits islands. 2. Of seed pods, worn by S. African natives  
British Museum

peoples of Asia, Polynesia, and Africa. Anklets are made of metals, glass, and also of textiles and woven grasses. Asiatic dancing girls often have small bells attached to their anklets, while some African tribes wear anklets of spiky grasses as a protection from snakes.

**Ankober.** Town of Abyssinia. The former capital of Shoa, it stands 8,700 ft. high on the E. slope of the Shoa plateau, and is 90 m. N.E. of Addis Ababa. It is now a hut village on the trade route. Pop. 2,000.

**Ankylosis.** Partial or complete fixation of a joint resulting from inflammation following disease or



**Annam.** Historic name of Central Vietnam, from 1946 part of the republic of Vietnam (*q.v.*). Extending for 750 m. along the China Sea, with a mean breadth of 93 m., it adjoins Tongking (N. Vietnam) on the N., Laos and Cambodia on the W., and Cochin-China (S. Vietnam) on the S.W.; area 56,973 sq. m.

**POPULATION.** The earliest inhabitants, long-headed Indonesians, are represented by the primitive Kha, Moï, and Muong, now upland dwellers. The kindred Cham, who, under Hindu and afterwards Muslim culture, maintained during eleven centuries the Champa power, now form a remnant in Binh-thuan and Khanh-hoa valleys. The Giaochi, immigrant from Tibet, have become by fusion the now dominant Annamese. Most of the people (est. 6,500,000) are Annamese, the rest being chiefly Kha, with Tai, Cham, some Chinese, Minh-huong—offspring of Chinese fathers and Annamese mothers—and a few Europeans. The official Confucianism, besides Chinese Buddhism and Taoism, is subordinated to ancestor worship, with a substratum of spirit worship. The primitive peoples are animist.

**PHYSICAL FEATURES.** A longitudinal backbone extends between the Mekong valley and the sea. The W. boundary of Annam approximates to the mountain crest, except in the S., where a detour takes in the upper waters of two Mekong affluents, the Sebangkhan and Donnai. Averaging 2,150 ft. high, with occasional peaks up to 8,350 ft., this forest-clad ridge is ramparted along its eastern base by foot-hills 15 m. to 30 m. broad, sinking into a cultivable coastal plain 12 m. to 50 m. broad. Two rivers, the Songma and Song-ka, have formed very densely populated rice-deltas. The other streams, short and unnavigable, send down in winter silt-laden torrents, which have formed dunes and lagoons, especially along the ironbound coast down to Tourane. Indurated limestone beds have been hollowed into extensive caves, either by sea action, as at Tourane, or by river action, as at Bo-kinh, in Kwang-binh. The climate is governed by the winds. The N.E. trades from Oct. to May are attended by a temperature from 59° to 75° F., and a heavy rainfall, mostly from Sept. to Dec. The S.W. monsoon, discharging its moisture in Cambodia and Laos, causes a dry season, with a June-Aug. temperature from 86° to 95°.

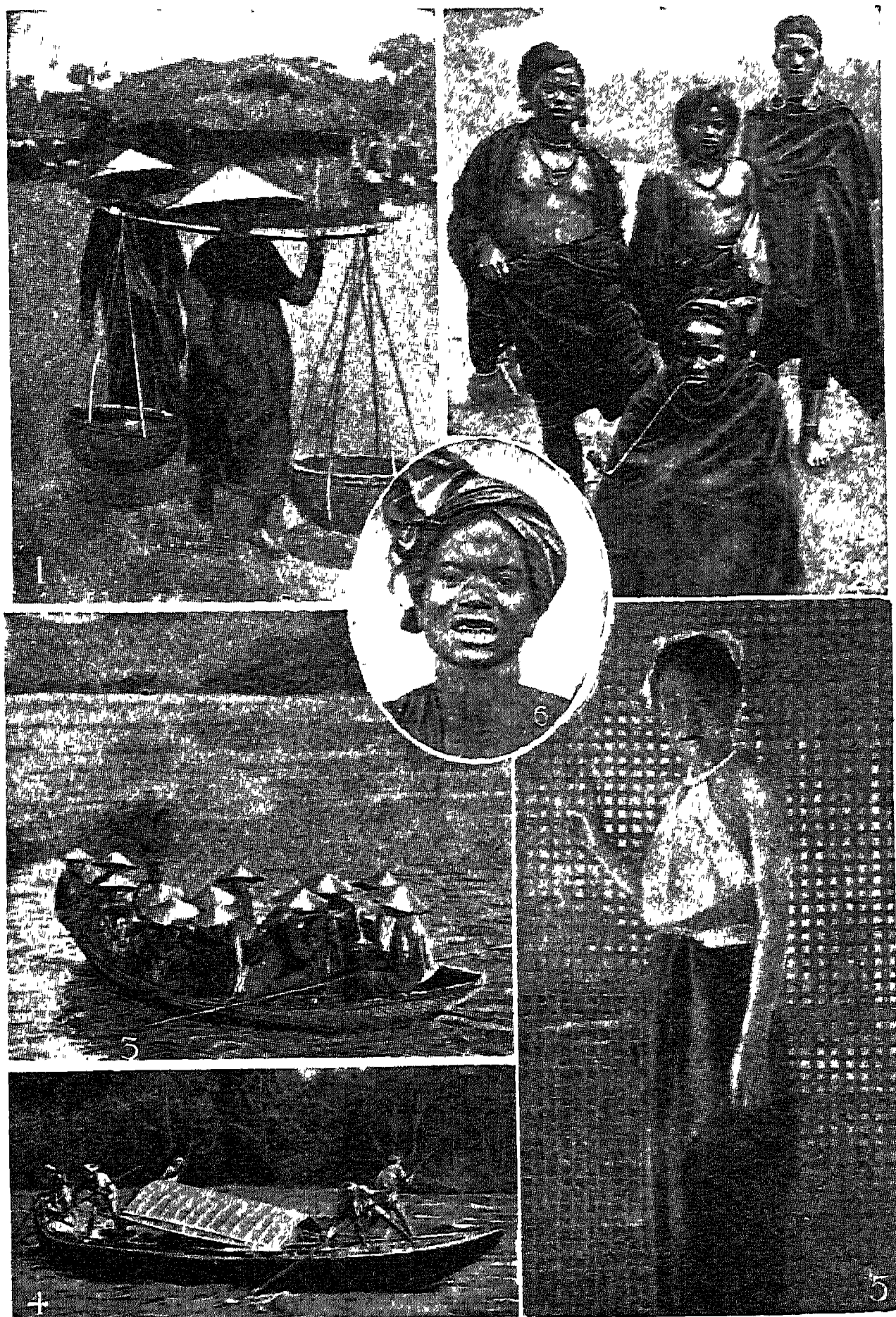
**INDUSTRIES.** There are three economic regions. The N. region,

based on Hai-fong in Tongking, shares the rice-growing and mining activity of that protectorate. The central region, based on Tourane, is unsuited for rice, which is imported, but produces millet and other cereals. The S. or Cham region, based on Saigon in Cochin-China, depends on agriculture, silk, timber, and coast-fishing. Other products are sugar, cotton, maize, bamboo, ground-nut, oilseeds, tobacco, and spices. In 1944 there were nearly a million head of cattle. Coal is mined near Tourane, magnetic iron-ore in Ngean, there is some native smelting, and the output of gold and other metals is developing. There are salt works in N., Central, and S. Annam.

The mandarin road from Tongking into Cochin-China passes through the capitals of the coastal

provinces; in Annam this road frequently degenerates into a mere track. But there are 2,000 m. of rly., including a coast line from the Chinese border in the N. to Mytho in the S., through Hanoi, Hué, and Saigon, and a transverse line E. to N.W. from Hai-fong to Yunnan in China. Hué (*q.v.*), the capital, has a pop. of 13,056.

**HISTORY.** After many centuries of Chinese domination a native monarchy, established in 968, gradually overcame the Champa power and attained final independence from China in 1428. French intervention, begun in 1787, led in 1884 to formal suzerainty, and until 1945 Annam remained a native monarchy under French control. The emperor Bao-Dai, who succeeded in 1926, resided at Hué, and was aided



Annam (Central Vietnam), Indo-China. 1. Transport of produce in baskets balanced on the shoulder. 2. Annamese costume. 3. Women going to market. 4. Poling a river boat. 5. A woman of the interior. 6. Youth with filed teeth





S. Anne with the Holy Family and S. John, from a famous painting by Raphael  
*Villa Borghese, Rome*

married women. Though held in high honour in the Middle Ages, her festival (July 26) was not generally observed in the Church until 1584. It is retained in the calendar of the Church of England.

**Anne** (1665-1714). Queen of Great Britain and Ireland. The younger daughter of James II by his first wife, Anne Hyde, daughter of the earl of Clarendon, she was born in London, Feb. 6, 1665. Her childhood passed quietly, its most important incident being the beginning of the friendship between the princess and Sarah Jennings, afterwards duchess of Marlborough, who for long were Mrs. Morley and Mrs. Freeman to each other.

In July, 1683, Anne was married to Prince George of Denmark (1653-1708), and after five years of quiet domestic life came the upheaval of 1688. When William of Orange landed in England she deserted her father and went over to the side of her Dutch brother-in-law, this step being due partly to her friend, then Mrs. Churchill, and partly, no doubt, to zeal for the

Protestant faith. The Bill of Rights, passed in 1689, laid it down that no "papist," or person married to a "papist," could inherit the crown (thus excluding Anne's half-brother James, later the "Old Pretender"), and made her own accession likely should neither Mary nor William leave a child.

During the reign of William and Mary, Anne was in disgrace, a fact chiefly due to her friendship for the Churchills, but she obstinately refused to dismiss her favourite lady. Soon after Mary's death in 1694, Anne was reconciled with William and resumed her place in the life of the court.

In March, 1702, William III died, and Anne became queen, almost her first act being to provide lavishly for her husband, Prince George, and her friends the Marlboroughs. In the war of the Spanish Succession the arms of Britain under the leadership of Marlborough won brilliant victories, the fruits of which were gathered when the treaty of

Utrecht was signed in 1713. In 1707, while the war was in progress, England and Scotland were united, and in domestic politics the present system of party government, directed by a cabinet, the members of which all profess the same political creed, was inaugurated. The literary splendours of the reign earned for it the title of the Augustan Age of English literature, and it is adorned with the names of Addison, Pope, Swift, and Defoe.

Although a woman of few attainments and no talents, afflicted by constant illness and harassed by domestic troubles, Anne made a good queen. Only in ecclesiastical matters did she show any strong opinions, and her devotion to the Church of England was proved by her support of Dr. Sacheverell and the restoration to its funds of the first fruits of every benefice, still known as Queen Anne's Bounty. Her preference for the Tories, largely due to this cause, was shown by her rejoicing openly when a Tory ministry was formed in 1710.

In 1707 came one of the great events of her life, her estrangement from the duchess of Marlborough. The chief cause of the quarrel was undoubtedly the influence which Mrs. Masham, a relative of the duchess and a servant of old standing, was acquiring with Anne; henceforth she and not Mrs. Freeman was the favourite and counsellor of royalty.

In spite of her personal leaning towards the restoration of the



*ANNE*

Anne, Queen of Great Britain, from a painting by Sir Godfrey Kneller





Anne, Queen of Great Britain and Ireland. "The view of the charity-children in the Strand, upon the VII of July, MDCCXIII, being the day appointed by her late Majesty Queen Anne for a public thanksgiving for the peace (of Utrecht), when both Houses of Parliament made a solemn procession to the cathedral of S. Paul"  
From a print of 1715

Stuarts, Anne had recognized, tacitly at all events, the succession of the elector of Hanover, when she died at Kensington, Aug. 1, 1714. She was buried in Henry VII's Chapel in Westminster Abbey. She had borne seventeen children, but only one, William, duke of Gloucester, survived infancy, and he died when only ten years old. Anne's private life was exemplary, and in her narrow way she showed a sincere desire to do her duty to the country. *Consult* Life, M. R. Hopkinson, 1934.

**Anne of BOHEMIA** (1366-94). Queen of Richard II of England. The eldest daughter of the emperor Charles IV, she was born at Prague, May 11, 1366. She married Richard in 1382 (N.S.). In 1392 she mediated between the king and the citizens of London, who had refused Richard a loan of £1,000. She died of plague at Sheen, June 7, 1394, and was buried in Westminster Abbey.

**Anne** (1456-85). Queen of Richard III of England. A daughter of Richard Nevill, earl of Warwick, "the king-maker," she was born at Warwick Castle, June 11, 1456. In 1470 she was betrothed to Edward, prince of Wales, son of Henry VI, and after his death at the battle of Tewkes-

bury was married in 1474 to Richard, duke of Gloucester, who became king in 1483. She died March 16, 1485.

**Anne of CLEVES** (1515-57). The fourth queen of Henry VIII. Born Sept. 22, 1515, daughter of John, duke of Cleves, she was married to Henry Jan. 6, 1540. Neither attracted by her person, nor willing to seem in alliance with the Protestants of Germany, Henry obtained an annulment of the union from parliament on July 9 of the same year. Anne was pensioned on the understanding that she should not leave the kingdom. Surviving Henry and Edward VI, she died at Chelsea, July 16, 1557, and was buried in Westminster Abbey.

**Anne of DENMARK** (1574-1619). Queen of James VI of Scotland, I of England. She was born in Jutland, Dec. 12, 1574, the daughter of Frederick, king of Denmark and Norway. In 1589 James sailed to Norway, and the marriage with Anne, already contracted by proxy, was celebrated at Opslo (Oslo). They resided in Scotland until the death of Elizabeth I. In 1603 Anne was crowned as queen consort when James was crowned king of England at Windsor. She was extrava-

gant, and had little influence in state affairs. The R.C.s in Scotland and England were encouraged by her coquetting with Rome, but their hopes were disappointed. Of her five children only two outlived their father, Elizabeth, queen of Bohemia, and Charles I. She died March 2, 1619.

**Anne of AUSTRIA** (1601-66). Queen of Louis XIII of France. The daughter of Philip III of Spain, she married Louis in 1615. The union was unhappy, chiefly owing to Cardinal Richelieu's hostility to Austria; and the repugnance of Louis to his wife was not lessened by the folly of George Villiers, the 1st duke of Buckingham, who openly made love to Anne at Amiens. When Louis died in 1643, Anne as regent made Cardinal Mazarin her minister. She became greatly attached to Mazarin, whom she is believed by some to have married, and after his death lived in retirement at the convent of Val de Grace. Of her two sons, Louis became king as Louis XIV. She died Jan. 20, 1666.

*Bibliography.* Mems. on Anne of Austria and her Court, Mme. de Motteville, Eng. trans. K. P. Wormeley, 1902; Anne of Austria, M. Buchanan, 1937.



Anne. Left to right: Anne Nevill, queen of Richard III of England; Anne Boleyn, second queen of Henry VIII; Anne of Cleves, fourth queen of Henry VIII; Anne of Denmark, queen of James VI of Scotland and I of England

**Anne IVANOVNA** (1693–1740). Empress of Russia. The younger daughter of Ivan V, she was married to the



Anne Ivanovna,  
Empress of Russia

to the duke of Courland in 1710. Widowed in 1711, she governed the duchy until 1730, when, on the death of Peter II, she accepted the Russian throne. Once recognized as autocrat in March, 1730, she abolished the council and kept the government in the hands of foreigners, chief among whom was her favourite Biren. On her deathbed she appointed Biren regent for her infant great-nephew Ivan, son of Anne Leopoldovna (*v.i.*).

**Anne LEOPOLDVNA OR CARLOVNA** (1718–46). Regent of Russia. The daughter of Charles Leopold, duke of Mecklenburg-Schwerin, she was also niece of the empress Anne Ivanovna, who early adopted her. In 1739 she married Anton Ulrich, duke of Brunswick-Wolfenbüttel. Her son, born in 1740, was adopted by the Empress, on whose death in 1740 he became tsar as Ivan VI. Biren, the actual ruler of Russia, was then displaced by a conspiracy and Anne was proclaimed regent in his place, taking the title of grand-duchess. In Dec., 1741, she was deprived of the regency by a bloodless revolution, which deposed Ivan and made Elizabeth, daughter of Peter the Great, empress. She died in exile.

**Anne** (1477–1514). Duchess of Brittany. Daughter of Francis II, duke of Brittany (then almost an independent state), she succeeded him on his death in 1488. Unable to secure her hand by peaceful means, Charles VIII of France sent an army into Brittany, whereupon Anne was married by proxy to Maximilian of Austria, but the marriage was never consummated. She later married Charles VIII, and, after his death in 1498, his successor Louis XII.

**Anne** (b. 1950). British princess. Daughter of Elizabeth II and the duke of Edinburgh, Anne Elizabeth Alice Louise was born Aug. 15, 1950. When



Anne,  
British princess

her mother acceded to the throne in 1952, Anne became second in succession.

**Annealing** (A.S. *anaclan*, to burn). Process applied to various materials, chiefly metals and ceramics, including glass, in order (1) to remove internal stresses set up during the processes of manufacture, (2) to remove or reduce the hardening effect of plastic working such as rolling or drawing, or (3) to remove, sometimes locally, the effect of previous heat-treatment, *e.g.* tempering in steel or age-hardening in light alloys. The material is heated to a sufficiently high temperature to cause internal recrystallisation or reorientation of the crystal boundaries; slow cooling usually follows. Very large articles of glass such as searchlight mirrors and telescope lenses are cooled over weeks or even months at a carefully controlled rate.

Most structural metal products are annealed at some stage in their manufacture. Structural castings, particularly those required to maintain dimensional stability, are usually annealed after final machining to remove internal stresses set up by uneven cooling from the molten state, even when they are subsequently subjected to some other form of heat treatment to improve the mechanical properties. Wrought metals, *e.g.* sheet, tube, wire, sections and forgings, must in general be annealed at one or more stages in their production from the cast ingot, in order to remove the hardening effect of the rolling, drawing, or forging, and to render them capable of further working without cracking or splitting.

Where additional forming operations are to be carried out on the wrought material, such as the pressing or deep-drawing of sheet into utensils, or the bending or pressing of strip or sections into structural elements, annealed or partly annealed starting material is employed.

In general, particularly in the case of relatively pure metals, fully annealed material has the minimum hardness, as measured by the indentation or scratch tests, the minimum strength as measured by the tensile break test, and the maximum ductility as measured by the extension on break. Some alloys, including most of the heat-treated light alloys, are in the fully annealed condition immediately after the initial heating and quenching and can be subjected to forming operations while in this condition

before the final age-hardening or precipitation process. To anneal metals in part, by heating to moderate temperatures, is not usually advisable, as the results are rather uncertain. Where partly annealed sheet is required, *e.g.* for deep drawing in dies, it is usual to anneal fully and then subject the material to a moderate amount of further work. Such material is known as quarter-hard or half-hard, as the case may be.

Freeman Horn

**Anne Boleyn** (1507–36). Queen of Henry VIII. Younger daughter of Sir Thomas Boleyn, created earl of Wiltshire, Anne was taken to court in early life. There the



Anne Boleyn. This drawing by Holbein portrays the queen who went to her death at the age of twenty-nine as a woman of serenity and dignity  
Windsor Castle

king became enamoured of her, but found she was not to be won except by marriage. For this and other reasons he resolved to rid himself of Catherine of Aragon, and throughout the proceedings for her divorce treated Anne quite openly as his future queen. In Nov., 1532, or Jan., 1533, when he had finally decided what course to adopt with regard to Catherine, he was privately married to Anne; as soon as Cranmer had pronounced his former marriage null the ceremony was performed publicly. In Sept., 1533, Anne's daughter Elizabeth, later Queen Elizabeth I, was born.

Henry, however, soon tired of his new queen. Her conduct was by no means discreet; she failed to give him the son he desired, and Jane Seymour had attracted his attention. A case against the marriage was brought in the ecclesiastical court, and Cranmer pronounced it void. At the same time Anne was tried for treason



before a special court, her alleged offence being not merely adultery, but incest. Her condemnation was a foregone conclusion, although the truth of these charges is doubtful, and she was beheaded on Tower Green, May 19, 1536.

**Annecy.** Town of France, capital of the department of Haute-Savoie. An important rly. junction, it lies at the N.W. end of Lake Annecy, 24 m. N.E. of Aix-les-Bains. It was part of Savoy until 1860 when, as the result of a plebiscite, it was annexed to France. A lovely town, with some arcaded streets, it has a cathedral, many churches, a castle, an episcopal palace, and a public garden on a peninsula jutting into the lake. There are spinning mills, and factories making razor blades, paper, chocolate. Annecy is also a noted tourist centre. Pop. (1954) 33,114.

Lake Annecy, 9 m. long by 2 m. wide, is nearly 1,460 ft. above sea level; the river Fier carries its waters to the Rhône.

**Annelida.** Phylum of the animal kingdom which includes many of the worms. Annelids are invertebrate animals with elongated bodies which are externally divided into a number of rings indicative of a corresponding internal division of the animal into a number of parts or segments, each segment containing its own set of excretory tubules (nephridia) and certain other organs. The partition (septum) dividing one segment from the next allows some structures, *e.g.* the digestive tract and the nerve-chord and blood vessels, to pass along the length of the body.

The nerve-chord occupies a ventral (lowermost) position, a feature that distinguishes the Annelida and other invertebrates from the chordates with their dorsal (uppermost) nerve-chord. In each segment it forms a small swelling, or ganglion, responsible for the local coordination of muscles and other tissues. The first ganglion, in the head region, is enlarged to form a primitive "brain." In land-living forms (*e.g.* the earthworm) respiration occurs through the moist body-wall; many marine annelids obtain their oxygen with the aid of special tentacles offering a large surface area to the water. Both ovaries and testes are usually present in the same individual, but cross-fertilisation is nevertheless common.

There are four main classes of annelids. The marine Polychaeta,

bearing many bristles, include a number of varied forms; some are free-swimming; others live in burrows or occupy complicated tubes made of sand particles stuck together with a mucous secretion. The Oligochaeta, having relatively few bristles, are in the main land-living and burrowing, the best-known and most numerous species being the earthworms. The Archannelida are a small group of very simplified worms. The aquatic Hirudinea, or leeches, completely lack bristles and have an externally segmented and extremely



Annecy, France. Showing the castle, the canal, and Pont de Thion, and the quays from which passengers embark on the lake steamers

elastic body (which can roll up into a ball or stretch into the shape of an earthworm) with prominent suckers at each end.

**Annexation** (Latin *ad*, to; *nectere*, to bind). In international law, the assumption by a state of sovereignty over territory not previously within its dominions. In olden days this was called conquest. The term annexation carries with it the meaning that the acquiring state takes over the territory acquired without regard to the wishes of the people of that territory. Modern instances are the annexation by Germany of Austria in 1938 and of Czechoslovakia in 1939, and the annexation of Albania by Italy in 1939.

**Annie Laurie.** Eighteenth-century Scottish song by William Douglas. Annie Laurie was a real person, who lived 1682–1764. The daughter of Sir Robert Laurie, 1st bart., of Maxwellton House, Dumfriesshire, she married Alexander Ferguson of Craigdarrock in 1717. William Douglas, of Fingland, Kirkcudbright, was her rejected suitor; he afterwards made a runaway match with Betty

Clark, of Glenboig, Galloway. The words of his song were first printed by C. K. Sharpe, in 1824. They were remodelled in 1835 by Alicia Ann Spottiswoode (1810–1900), wife of Lord John Montague-Douglas Scott; she added a third verse and also composed the music.

**Anning, MARY** (1799–1847). British palaeontologist. Born at Lyme Regis May, 1799, she was the daughter of a cabinet maker whose hobby was the collecting of fossils from the neighbouring cliffs. As a child she accompanied her father on his expedi-

tions; and after his death continued the pursuit. In 1811 she discovered the first complete ichthyosaurus. With the aid of local workmen the 30-ft. skeleton was dug out of the lias block in which it was embedded. For years it was thought to be that of a crocodile, but its true identity was in due course established and it was removed to the South Kensington museum. Later she discovered a skeleton of the plesiosaurus, and in 1828 the remains of a pterodactyl. She received a small govt. grant. She died, little honoured, in her native town March 19, 1847.

**Anniston.** City of Alabama, U.S.A., the co. seat of Calhoun county. A health resort on the slope of the Blue Mts., it is 55 m. E. of Birmingham, on the Southern rly. Founded in 1872 by an iron company, it has a number of industries connected with the iron found around it, and is a centre of the cotton trade. Pop. (1950) 31,066.

**Anno** OR HANNO (d. 1075). A German saint and ecclesiastic. He was made archbishop of Cologne in

1056. In 1062 he was entrusted with the education of the young emperor Henry IV and was made regent of the empire. He reformed all the monasteries in his diocese. He died at Cologne, Dec. 4, 1075, and was canonised by Pope Lucius III in 1183.

**Annobon.** Small island in the Gulf of Guinea, belonging to Spain. It is 110 m. S.W. of St. Thomas, and is 4 m. long by 2 m. broad; area, under 7 sq. m. The chief town is San Antonio de Praia, and the roadstead is visited by ships for water and provisions.

**Anno Domini** (Lat., in the year of the Lord). Phrase, abbreviated A.D., used for the chronology of the Christian era, the previous time being described as B.C.—i.e. before Christ. According to tradition, it was introduced in the 6th century by the Roman abbot Dionysius Exiguus. In Charlemagne's will occurs the phrase "anno ab incarnatione domini nostri Iesu Christi, 811," in the year 811 after the incarnation of Our Lord Jesus Christ. In a written date, the letters A.D. should precede the year.

**Annonay.** Town of France, in the department of Ardèche. It is 50 m. S. of Lyons, on the Cance, a tributary of the Rhône. It has remains of medieval fortifications and houses, and a Gothic church with hexagonal steeple. An important paper-making centre, Annonay has also tanneries, spinning mills, and motor-body building works, and makes gelatine, underwear, and furnishing fabrics. Pop. (1954) 16,201.

**Annual Register, THE.** British yearly review of public events at home and abroad, begun by Robert Dodsley in 1759. For many years Edmund Burke was the principal contributor. A rival publication was begun by Rivingtons in 1791, and the two were combined in 1824. Longmans acquired the work in 1890. From the vol. covering 1947 an advisory board (instead of a single editor) was responsible for its contents.

Sir Walter Scott edited a publication called *The Edinburgh Annual Register*, 1808–27. *The New Annual Register* was published during 1780–1825; *The Annual Review*, 1802–08.

**Annals.** In botany, plants which complete their life cycle in a single year. Summer annuals appear above ground in early spring from seeds which have lain dormant in the soil during the winter. They grow rapidly, flower, and set seed; after this is shed the plant

dies. Winter annuals germinate in the autumn and pass the winter as small seedlings. Mouse-eared chickweed (*Cerastium* spp.) and whitlow-grass (*Erophila verna*) are two winter annuals characteristic of some sand dune systems.

In horticulture, annuals are divided into two groups: (1) hardy annuals, which can be raised from seed and grown entirely in the open. They are sown in March or April for summer flowering, and in Aug. or Sept. for spring flowering. Examples are clarkia, cornflower, godetia, larkspur, poppies,

sweet peas; (2) half-hardy annuals, which are not perfectly hardy although they will stand a little frost. They are usually raised from seed sown in boxes in March or April in a greenhouse or frame with bottom heat. They must be hardened off before planting out in May or June. Examples are French and African marigolds, China asters, lobelias, zinnias. Annuals should be well soaked when watering. To obtain the fullest results in a garden a succession of seed should be sown at intervals of a fortnight or three weeks.



Annunciation. From D. G. Rossetti's painting, *Ecce Ancilla Domini!* See p. 450  
National Gallery, London





**Annunciation.** From the painting by the 17th-century Spanish artist Murillo  
Wallace Collection, London

**Annuity** (Latin *annus*, year). Series of payments, usually of equal amount, at regular intervals; it may be for a fixed number of years (annuity certain), for life, or in perpetuity. Types of life annuity are: single life, paid so long as the annuitant lives; joint lives, paid until the first death among two or more persons; joint lives and survivor, paid until the last death among two or more; reversionary, paid during the period (if any) that the annuitant survives some other person. Annuities may be immediate, when they begin one interval after purchase; or deferred, when they begin after a stated lapse of time, if the annuitant is still living.

Annuities are paid under wills and as pensions specially voted by governments; or they can be bought from insurance offices or the government for a capital sum. Deferred annuities are often pur-

chased by instalments. Conversely, a debt and the interest on it can be paid off by terminable annuities. Although the insured does not receive back any more of his capital after the annuity ceases, a higher yield is obtained on a life annuity than on a perpetuity, and an existing annuity can be sold or commuted for a lump sum.

Annuities other than perpetuities consist partly of a return of capital and partly of interest on the capital still outstanding, the interest portion falling as time goes on. Prices of annuities are computed by actuaries, using compound interest principles, the result depending on the rate of interest that can be earned by investments, on expenses, and on the expectation of life according to age and sex (women living, on the whole, longer than men).

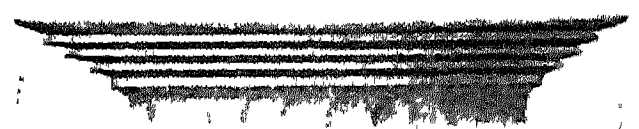
The idea of annuities is an old one, but their systematic use was

developed mainly in the Dutch Republic in the 17th century. Loans against annuities were known in Great Britain from the time of Charles II; and in 1808 the British government entered annuity business, from 1829 putting small annuities on sale to the general public. Government annuities up to £300 a year are sold through the post office savings bank and the trustee savings banks, and for larger sums through the national debt office. The cost of P.O. savings bank annuities depends on age, sex, and the current price of  $2\frac{1}{2}$  per cent Consols, according to a scale (revised in 1954) from which an extract follows:

Cost per £1 of Immediate Annuity, when price of $2\frac{1}{2}\%$ Consols is $66\frac{1}{2}$ , or between $66\frac{1}{2}$ and 69						
Age last birthday	Males			Females		
	£	s.	d.	£	s.	d.
20	24	1	1	24	19	2
30	22	2	6	23	2	11
40	19	13	0	20	19	3
50	16	9	1	18	3	11
60	12	11	4	14	11	6
70	8	15	5	10	7	10
80 or over	5	12	6	6	11	6

The scale is increased by a few shillings at higher prices of Consols. Thus for £1 of annuity, a man aged 60 pays £12 13s. 11d. when Consols are between 69 and  $71\frac{1}{2}$ , or £12 16s. 6d. when they are between  $71\frac{1}{2}$  and 74. Sometimes annuities are quoted at so much per £100 of purchase price. For instance, £12 10s. per £1 of annuity is the same as an annuity of £8 per £100 of capital.

**Annulet** (Lat. *annulus*, a ring). Architectural term for a small ring round a column; especially the fillets at the base of the Doric capital. In heraldry, as a mark of cadency, the word denotes the fifth son and his descendants.



**Annulet.** In architecture, the fillets of a Doric capital

**Annulus.** In botany, a ring of thin-walled cells in the capsule of a moss, or a zone of such cells in the sporangium of a fern, which by rupturing when drying plays a part in liberating the spores. Also, a ring of tissue around the stipe of some agarics.

**Annunciation** (Lat. *annuntiare*, to announce). Literally, the act of making known or announcing anything officially or publicly. The Feast of the Annunciation was

appointed by the Church to commemorate the day on which the archangel Gabriel announced to the Virgin Mary that she should bring forth a son and should call His name Jesus (Luke 1). The day, the observance of which dates from the 7th century, has always been observed in the Western Church on March 25, except in Milan, and for a time in Spain, when the Council of Toledo, 656, changed the date to Dec. 18 so that it should not occur in Lent. The original date was restored in Spain when Dec. 18 became the Feast of the Expectation of the Blessed Virgin. In the Church of England calendar the title is the Annunciation of the Virgin Mary; in the table of Lessons proper for holy days, Annunciation of Our Lady—hence Lady Day. The subject of the Annunciation has inspired many famous paintings.

**Annunziata**, ORDER OF THE. An Italian order of chivalry founded in 1362 by Amadeus VI, count of Savoy, suppressed 1946 when Italy became a republic. Amadeus VII adopted the motto *Fert* (literally, he brings), possibly an allusion to the relief of Rhodes by Amadeus V—*Fortitudo ejus Rhodum tenuit*, his bravery kept Rhodes—although no certain explanation can be given. It was remodelled in 1518, was taken over by Sardinia in 1869 when the counts of Savoy became rulers of Sardinia, and became Italian when Italy was unified under Victor Emmanuel II, king of Sardinia. The badge was a representation of the Annunciation, surrounded by knots; the ribbon was blue.

**Annunzio**, GABRIELE D' (1863–1938). Italian author and imperialist. He was born at Pescara, March 12, 1863, of Dalmatian extraction, and studied at Rome university. A lyric poet from boyhood, he achieved fame with *Canto Nuovo*, 1882, and followed



Gabriele d'Annunzio

it with a succession of poems, short stories, and novels. The brilliance and beauty of his descriptive passages led some to hail him as the greatest of modern Italian writers, while many attacked him as a perverter of public morals. The novels *Il Trionfo della Morte* (the Triumph of Death), 1894, and *Le Vergini delle Rocce* (the virgins of the

rocks), 1896, were translated into English. A scandal broke out over *Il Fuoco* (the fire) in 1900, as a result of the cruel treatment therein of the actress Eleonora Duse (*q.v.*), with whom he had had a love affair, and all his books were placed on the papal index. With *Laudi del Cielo, del Mare, della Terra e degli Eroi* (praise of the sky, sea, earth, and heroes), he was hailed as a great national poet.

In the First Great War d'Annunzio served in the Italian cavalry, infantry, navy, and, with great gallantry, as an airman, losing an eye—he published *Notturmo* (nocturne) in 1918 describing his feelings while blind after this accident. In Sept., 1919, asserting that the peace conference was betraying Italy, he led a raid on Fiume (*q.v.*), which he occupied and ruled for more than a year like a Renaissance despot until forcibly ejected by the Italian government. At first against Mussolini, he was reconciled to him in 1923, and next year was created prince of Montenevoso. He married in 1883 the Duchessini Maria Gallese; he was notorious for his amours.

In 1935 appeared what many critics considered his greatest work—the autobiographical *Cento cento e cento pagine del libro segreto di G. d'A.* (pages by the hundred from the secret book of G. d'A.). He died at Gardone, Lake Garda, March 1, 1938. *Consult* Lives, I. Nardelli and A. Livingston, 1931; G. Griffin, 1935; T. Antongini, 1938.

**Anode**. Term invented by Faraday for the positive electrode, through which the (conventional) current flows into a piece of electrical apparatus such as an electrolytic cell or a thermionic valve. Inside the apparatus, therefore, the electrons (and other negative ions) move towards the anode, and away from the cathode.

**Anodising**. Electrochemical process for thickening the natural oxide film on aluminium surfaces. It forms a thick oxide film which is hard, strongly adherent, and highly resistant to chemical attack. The aluminium or aluminium alloy, after cleaning and degreasing, is made the anode in an electrolytic cell through which a current is passed. There are three main processes, using chromic acid, oxalic acid, and sulphuric acid as the electrolytes, to give opaque, semi-transparent, and transparent films respectively. All these can be dyed.

**Anointing**. Ceremonial use of consecrated oil. The origin of this use is unknown. It is from earliest

times associated with divine ordinances. The title Christ signifies the Anointed One. The Messiah is thus prophetically alluded to in 1 Samuel, 2, v. 35. The practice of anointing with oil or ointment is often referred to in the Bible, e.g. Gen. 28 and 35; Ex. 29 and 30; 1 Sam. 10 and 15; 2 Kings 9; Matt. 6; Luke 4; James 5. The custom prevailed in the early Christian church of anointing at baptism, confirmation, in time of sickness, and at ordination, and is still so retained in the R.C. church. In the Anglican church anointing at ordination and confirmation ceased in 1549; at baptism and the visitation of the sick in 1552; and is retained only at a coronation of a sovereign.

**Anolis**. Genus of lizards, called anoli in the Antilles, and also sometimes called American chameleons. It is the largest and most widely distributed genus of lizards in the western hemisphere. All species are of small or medium size with relatively long tails. They have a fold of skin beneath the throat which can be fanned out in a threat-gesture, most are active climbers, and many can change colour.

**Anomalistic Year**. The time of the earth's yearly movement round the sun reckoned from perihelion to perihelion. The earth moves with a different speed in its orbit at different times of the year, moving most swiftly at perihelion when nearest to the sun, and most slowly at aphelion when farthest away from it. Owing to the precession of the equinoxes, the anomalistic year is longer than the true or tropical year by about 25 mins. The anomalistic month is similarly reckoned from one passage of the moon through her perigee (*i.e.* her nearest approach to the earth) to the next.

**Anomaly**. Term used in English law. Where some suggested doctrine stands in contradiction to general legal principles it is anomalous; and this fact furnishes a powerful argument to show that it is not good law. Nevertheless, there are many legal anomalies. The word is also used where, in exceptional cases, the general rules of law do not operate satisfactorily. Situations of this kind arise frequently in connexion with income tax and death duties, and the dept. of inland revenue allows certain concessions.

**Anorthite**. Silicate of calcium and aluminium, a member of the plagioclase feldspars. It crystallises in forms of the triclinic



system. It is a prime constituent of basalt and other igneous rocks.

**Anopheles.** Genus of mosquitoes with many species, four of which occur in Great Britain. The species, including *Apopheles maculipennis* which is British, are the most important primary hosts of the protozoal organisms (*Plasmodium*) which cause malaria and related diseases in man. In all species the eggs are laid singly in water and have floats on their sides.

**Anorexia** (Gr., loss of appetite). Condition that occurs mildly as a common reaction to both physical and mental illness. There is also a serious form called "anorexia nervosa" which is a mental illness mainly of hysterical origin. Loss of weight may be so serious that sufferers can be kept alive only with difficulty. Such is their refusal to eat that they may show great skill in deceitfully disposing of food.

**Anouilh, JEAN** (b. 1910). French dramatist. Born at Bordeaux, he studied law in Paris for a short time. Then he entered the theatre on the business side, but soon turned to play-writing, his first play, *L'Hermine*, being produced in 1932. Anouilh's numerous plays—most of them fantasies—include *Le Voyageur sans Bagages*, 1937; *Roméo et Jeannette* (Eng. production as *Fading Mansion*, 1949); *Antigone*, 1949; *L'Invitation au Château* (Ring Round the Moon, 1950); *Eurydice* (Point of Departure, 1950); *Ardèle*, 1951; *Colombe*, 1951; *L'Alouette* (The Lark, 1955). He also wrote the scripts for *Monsieur Vincent* and other films.

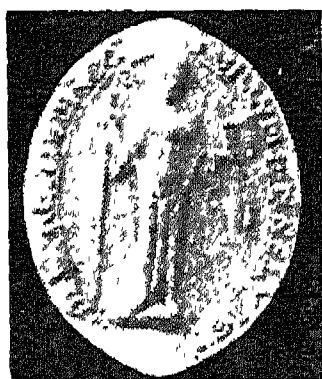
**Ansbach** OR ANSPACH. Capital of Mittelfranken dist., W. Germany. On the Rezat, 27 m. by rly. S.W. of Nuremberg, it has brewing, iron-founding and other industries, and trades in agricultural produce. As the residence of the margraves of Ansbach, it was a place of some importance; their palace, erected 1713-23 and now used for public offices, stands in a large park. Ansbach has several fine ancient churches and a good museum. The little principality of which it was the capital was long ruled by a branch of the Hohenzollern family, who obtained it in 1362 and called themselves margraves. It was sold to Prussia 1791, transferred to Bavaria 1806. Pop. (1954) 34,013.

**Anschluss** (Ger., joining). Word used by German propagandists to describe the plan for union of Austria with Germany. This union was forbidden (save by the consent of the League of Nations)

in 1919 by the Treaty of St. Germain: but, after long agitation, and some support in Austria for the idea of the Anschluss. Hitler sent his troops into Austria on March 11, 1938. The next day the Austrian government promulgated a law whereby the federal state of Austria was dissolved and Austria was declared a land of the German Reich, with the same status as Prussia, Bavaria, etc.

**Ansell, JOHN** (1874-1948). An English musician. Born in London, March 26, 1874, he studied at the Guildhall school of music, and was musical director at various London theatres from 1907 onwards, with an interval from 1926 to 1930 with the B.B.C. He composed comic operas, including *Violette*, 1918, and orchestral pieces of which the overture *Plymouth Hoe* is best known. He died Dec. 14, 1948.

**Anselm** (1033-1109). English saint, archbishop, and theologian. Born at Aosta, he entered in 1060



S. Anselm's seal  
British Museum

the Benedictine abbey at Bec, and in 1078 was made abbot. On the death of Lanfranc, archbishop of Canterbury, in 1089 William Rufus appropriated the revenues of the see until 1093, when he appointed Anselm archbishop.

The king and Anselm were soon in collision. In 1094 William called upon the archbishop for a contribution to his war against Robert of Normandy, but he rejected the amount offered as insufficient. Anselm distributed his money and declined to make another offer. Anselm proposed to go to Pope Urban to obtain the archbishop's pallium: William asserted that neither pope nor antipope was to be recognized without his own authority. Anselm denied that the question was an open one and was supported by the barons. Though the Church denied that ecclesiastical appointments and lands were subject to the secular authority, William continued to extort money from the churchmen and called upon Anselm to furnish men for his Welsh war. When the bishop left England, the king again seized the revenues of Canterbury.

William was succeeded in 1100 by his brother Henry I, who at once sought a reconciliation with the exiled archbishop. Eventually, in 1105 a compromise was reached.

The insignia of ecclesiastical offices were to be bestowed only by spiritual authority; in return the prelates and abbots were to do homage for their temporalities. With the ratification of this settlement Anselm finally returned to England in 1107. He died April 21, 1109, and was canonised in 1494.

Anselm was the great theologian of his day, and one of the founders of medieval scholasticism.

**Ansgarius** OR ANSCHAR (801-865). Frankish saint and prelate, often styled the Apostle of the North. A native of Picardy, he became a monk at Corvei. In 826 he was sent to preach the Gospel to the Danes. After two years' work in Denmark he went to Sweden. Three years later he was appointed first archbishop of Hamburg. Returning to Scandinavia in 854, he founded churches in Denmark and Sweden, built hospitals, ransomed captives, and endeavoured to mitigate the slave trade.

**Anshan.** City of China. In Liaoning prov., Manchuria, 55 m. S.W. of Mukden, it is China's leading iron and steel centre. Based on local deposits, the first steel plant was erected here in 1918, extended under Japanese rule, and still further expanded under the Communist regime. Anshan also produces cement. Pop. (1953 est.) 400,000.

**Anson, GEORGE ANSON, BARON** (1697-1762). A British admiral. Born April 23, 1697, at Shugborough, Staffordshire, he entered the navy in 1712, became a captain 1724, and in 1739, on the outbreak of the war with Spain, was given command of a squadron of six ships in the Pacific. The expedition, which set out on Sept. 18, 1740, was ill-equipped and ill-manned, ships were lost off Cape Horn, and Anson's flagship.



Baron Anson of Soberton, British admiral

After Sir Joshua Reynolds

the Centurion, alone survived, returning by the Cape of Good Hope and reaching Portsmouth June 15, 1744, thus circumnavigating the globe. Spanish treasure to the value of £500,000 was a tangible result. Created rear-admiral of the blue in 1744, Anson's next triumph was the defeat of the French fleet off Cape Finisterre, May 3, 1747, in recognition of which he was raised to the peerage. He was first lord of the Admiralty from 1751, with a short interval, until his death at Moor Park, Herts, June 6, 1762.

The many successes of the British navy were in great measure due to Anson's home administration. He was also responsible for the organization of the marines in their present form, and his reconstruction of the articles of war lasted until 1865. The well-known Voyage Round the World, edited by Anson's chaplain, Richard Walter, is still a popular work.

**Anstey, F.** Pen-name of Thomas Anstey Guthrie (1856-1934), British humorist and playwright. Born at Kensington, Aug. 8, 1856, and educated at Trinity Hall, Cambridge, he was called to the bar, but abandoned law for authorship. He made a name with Vice Versa, A Lesson for Fathers, 1882, following this with other humorous fantasies such as The Giant's Robe, 1883; The Tinted Venus, 1885; and The Brass Bottle, 1900. Much of his best work appeared in Punch after he had joined the regular staff of that periodical in 1895, e.g. Voces Populi, Baboo Jabberjee, B.A., and The Man from Blankley's. The last-named enjoyed a vogue as a stage farce, as did stage versions of Vice Versa and The Brass Bottle. Guthrie died March 10, 1934, and an autobiography, A Long Retrospect, was published in 1936.

**Anstruther.** Original and still most widely used name of a harbour and fishing town of Fife, Scotland, officially called from 1929 the Royal Burgh of Kilrenny, Anstruther Easter, and Anstruther Wester. The pop. of the burgh in 1951 was 2,991. It stands on the firth of Forth, 9 m. S.S.E. of St. Andrews and 19 m. E. of Thornton Junc. by railway. It has a fine harbour, is the centre of the Fife fisheries, and engages in shipbuilding, fish-curing, and the manufacture of oilskin goods.

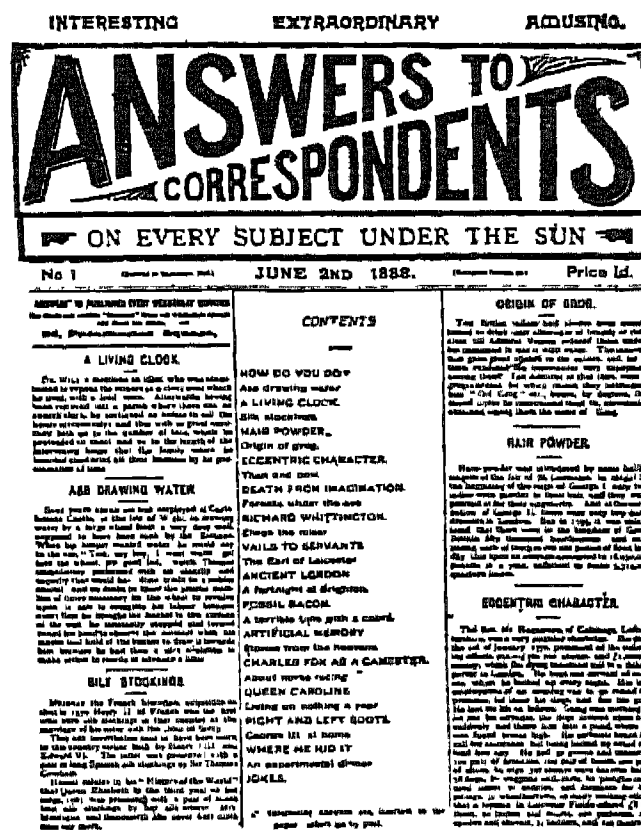
**Answers.** Weekly periodical started in 1888 by Alfred Harmsworth, later Viscount Northcliffe. As Answers to Correspondents it

appeared first on June 2, 1888, and soon attained an immense circulation. Competitions of various kinds, some of them with huge prizes attached, have appeared in its pages, and its contributors have included Thomas Hardy, J. K. Jerome, Sir A. Conan Doyle, John Strange Winter, and Sir Max

much in kind as in degree from those of men. Most remarkable in the ant is its power of memory. If an ant is taken from a nest, kept in captivity for several months, and then returned to the nest in company with a stranger, the latter will at once be killed and the former admitted into the home with every sign of recognition and pleasure. A colony of ants that have found a desirable cupboard, however far from their nest, during the summer, will come straight back to it after hibernation, showing that the fact of its existence and the route by which to reach it have both been remembered. Numerous experiments made by Lord Avebury and other investigators clearly establish the fact that ants are able to communicate with and impart information to one another. An ant that finds a scrap of food too large to carry away will hurry back to the nest and return with assistance. If one ant finds a large heap of food and another a small one, the former will bring a much more numerous company of assistants than the latter.

The practice of slave-keeping prevails among certain species. Raids are made on the nests of weaker species and, after battle, the pupae are carried off to the nest of the robbers, and the young ants reared and kept as workers for the community. One species of ant depends entirely upon slave labour for the work of the nest, and does nothing except occasionally carry out a slave raid on its weaker neighbours. The statement that ants keep cows is, in a sense, perfectly true. Ants are fond of feeding upon honeydew, a secretion of the aphides or plant lice, and commonly climb the stems of plants to obtain it. Certain species construct tunnels over the aphides or build walls of earth around them to prevent their escape. They convey the eggs of aphides to their nests, carefully tend the young, and in all ways show themselves accomplished cow-keepers. Other insects, such as small beetles, are also kept by ants in their nests, and carefully fed. It is improbable that the ants keep them as mere pets, so it is assumed that they serve some purpose which observers have so far failed to establish.

Ants are of three castes, queens, males, and workers, the last being neuters or sterile females. So far as is known, caste is determined by the conditions under which the larvae are reared. At certain seasons the young queens and



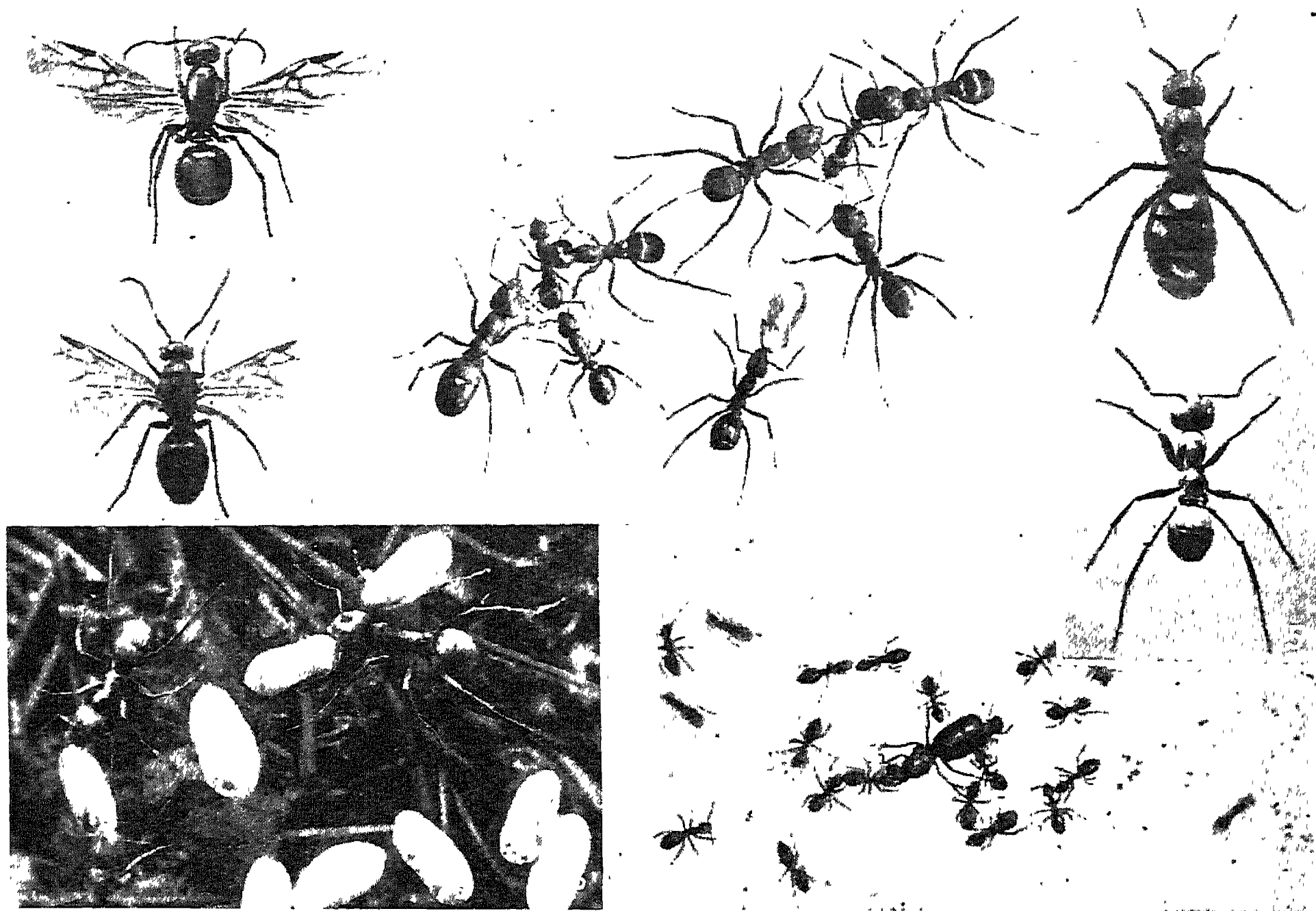
Answers. Reduced facsimile of front page of the first number of the popular weekly journal, issued June 2, 1888

Pemberton. The first of the papers issued by the firm which became later the Amalgamated Press (*q.v.*), it continued to appear until Jan., 1956.

**Ant.** Group of insects belonging to the order Hymenoptera (membrane-winged), which includes the bees and wasps. They are distinguished by having the first segment of the abdomen reduced in size to a mere stalk to which the rest of the abdomen is attached. The stalk bears a hump or tubercle (sometimes two) on its upper surface which is not found in other Hymenoptera. The queen and males have wings, but the workers, who constitute the bulk of each ant community, are wingless. About 2,000 species are known, and they occur in nearly all parts of the world except the frozen regions.

Ants are regarded as the most intelligent of all insects, and the economy of their communities is even more highly developed than that of the hive bee. It is held by many naturalists that, among all the creatures they have studied, in the ant instinct reaches its highest level. There is, in fact, scarcely any form of mental activity, apart from abstract reasoning, that does not suggest itself in the proceedings of this insect. Indeed, Lord Avebury went so far as to say of the ants generally, that their mental powers differ not so





Ant. 1. Female wood ant, before shedding her wings in the nuptial flight. 2. Winged male wood ant. 3. Slave raid by large red ants on the nest of a small black species with the object of carrying off the cocoons. 4. Wingless queen. 5. Typical worker, an imperfectly developed female. 6. Nest of wood ants, showing how cocoons are transported in the mandibles of a "nurse" worker. 7. Black ants taking the body of a queen which has died outside back to the nest

Photos, 1-5, 7, H Bastin; 6, Rev S. N Sedgwick

the males take a nuptial flight. On their return the queens lose their wings and settle down to egg-laying. There are often several queens in a single nest, and individual queens have been known to live and continue laying eggs for fifteen years.

The eggs are carried about by the workers from one part of the nest to another according to the temperature, and undergo a continual process of licking. They hatch in about sixteen days in warm weather, and the young larvae are fed with half-digested food and cleansed by the workers. In due course they turn into pupae, usually but not always wrapped in white silken cocoons, forming the so-called ants' eggs. After some days they emerge as perfect insects, are carefully cleaned by the nurse ants, and then go about the work of the community. The nest consists of a series of passages and chambers constructed sometimes in the ground, sometimes in masses of fallen leaves and wood débris, or in the trunks of old trees. In the tropics the nests are often of great size and of most elaborate construction. A large community will often construct several nests in close proximity.

Ants will eat almost any kind of animal or vegetable matter of a nutritious character, sweet things being much preferred. The British species do not lay up a store for the winter, though this is done by some in hotter climates. During the winter they remain dormant.

Certain species of ants can sting, but all possess a poison bag charged with formic acid as a protection against enemies. In some species this poison is conveyed by the bite, while in others it can be ejected to a distance of two feet or more. A handkerchief lightly brushed over a colony of common wood ants will be found to be charged with acid.

In the tropics ants are so numerous, so pugnacious, and so destructive that they become a serious pest. The insects of the tropics that are commonly known as "white ants" do not, however, belong to the same order (Hymenoptera) as the true ants, but to a separate order known as Isoptera, comprehensively called termites, and termite is the proper designation of an insect of this family.

To a certain extent ants are beneficial as scavengers, and sometimes serve a useful purpose in fertilising flowers. When they find

their way into houses, as they are fond of doing, they often become a source of annoyance and are usually difficult to expel. Powdered borax sprinkled about their haunts will discourage them, and they are said to dislike the odour of powdered cloves. When a cupboard is infested by them, a little turpentine injected into the crevices, or powdered camphor sprinkled about, will often get rid of them. See Insects; Termites; consult Ants, W. M. Wheeler, 1910; The Ant, E. Step, 1924; British Ants, H. Donisthorpe, 1927; Guests of British Ants, H. Donisthorpe, 1927; Ants, J. Huxley, 1935.

**Antacid.** Term occasionally used in medicine for a substance which neutralises acidity. The drug most frequently employed for this purpose is sodium bicarbonate, in doses of from 5 to 30 grains. It should be taken about half an hour after a meal, and is appropriate in those cases where pain is felt some hours after a meal and is associated with gaseous eructations. Less harmful antacids include aluminium hydroxide and magnesium trisilicate. Other magnesium preparations are also widely used.

**Antaeus.** In Greek mythology, a Libyan giant, son of Poseidon, god of the sea, and Gē (the earth). A mighty wrestler, he received fresh strength from a fall to the earth, his mother. He was conquered by Hercules, who held him up in his arms out of reach of the earth and squeezed him to death.

**Antalcidas.** Alternative spelling of Antialcides (*q.v.*), name of a Spartan diplomatist.

**Antalya.** Alternative form of Adalia (*q.v.*).

**Antananarivo** (French Tananarive). Capital of Madagascar, an overseas territory of the French Union. On a hill 4,750 ft. above sea level, on the central plateau of the island, and c. 228 m. by rly. S.W. of Tamatave, the chief port

its 14,000 m. of coastline are not completely known, and more than three-quarters of the inland area of 5,000,000 sq. m. have not been traversed by man. Graham Land is the land region farthest (1,750 m.) from the South Pole and also the nearest to one of the other continents, being less than 700 m. from South America. Exactly on the other side of Antarctica the long stretch of explored coast near Wilkes Land lies just beyond the Antarctic Circle, 1,600 odd miles from the Pole; Wilkes Land is about 1,700 m. from Tasmania. East of the Graham Land peninsula is the Weddell Sea, one of the great indentations into the outline of the continent; the other great bay is Ross Sea, fringed by

in King Edward Land, some 150 m. S.E. of the Bay of Whales. Inland of the mts., round the Pole itself, is a plateau where the overlying ice sheet is between 1,000 ft. and 2,000 ft. in thickness, and its surface is some 10,000 ft. above sea level. The extent of this plateau has still to be determined: it is not probable that it connects with King Edward Land. On the inland ice, slight depressions, in which move ice streams or false glaciers, have been discovered, and any explorer who approaches the Pole, as Shackleton intended, from a base on the Weddell Sea might be severely handicapped by the ice streams and mt. ranges which are known to exist between the Pole and the Weddell Sea.

Mt. Erebus on Ross Island, 13,000 ft., is an active volcano: the direction and shape of the clouds above the crater are a guide to the weather conditions in McMurdo Sound. Due S. the mts. which fringe the Beardmore Glacier rise to heights between 13,000 and 15,000 ft., and consist largely of a carboniferous formation in which seven seams of coal were detected in 1908. Most explorers in Antarctica have met blizzards of terrific intensity, and it is one of the tragedies of the South that so many have been detained for days together in camp by these fierce storms, unhappily in the case of Scott with serious loss of life. The continent contains the South Magnetic Pole, lying in Wilkes Land. The large Emperor penguin and the smaller penguins are familiar denizens of Ross Island.

Future work in determining the geography of the continent will depend upon pure scientific research on the one hand and on the other on commercial enterprise in an attempt to exploit the known coal deposits and to discover other deposits of minerals that may prove of commercial advantage. See Antarctic Exploration.

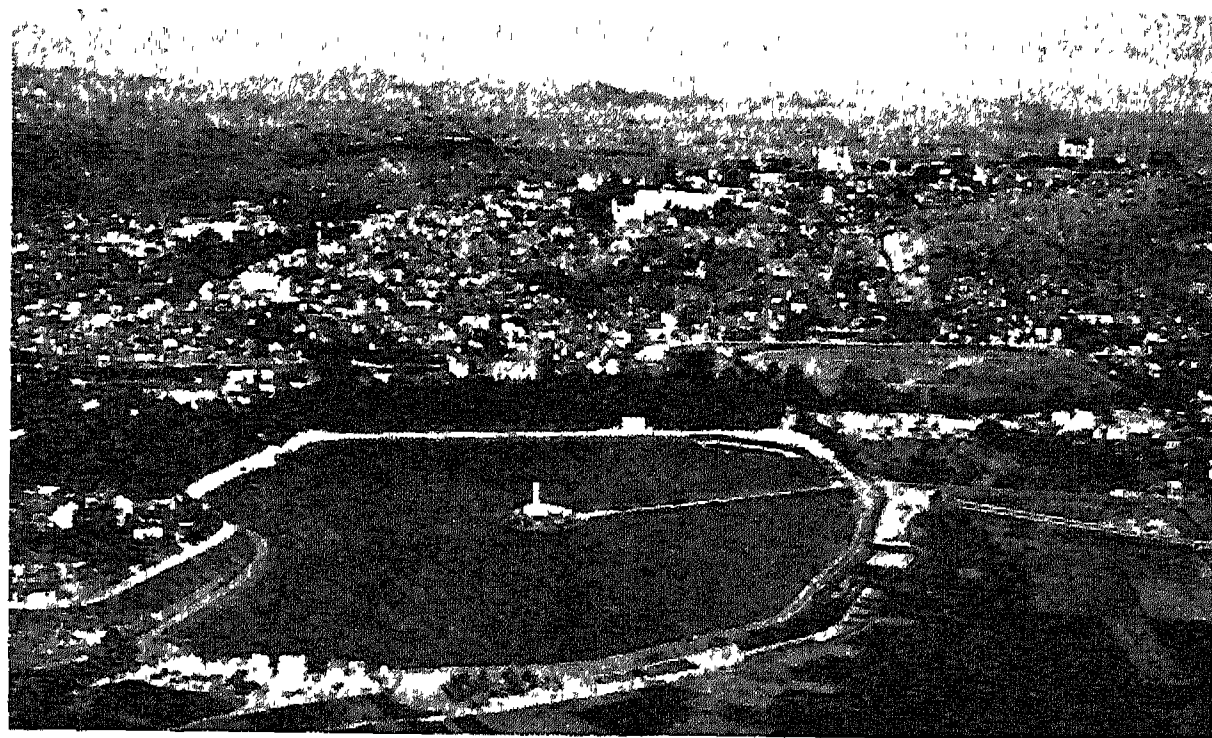
of the island, Antananarivo is picturesque, with steep, narrow paths winding up the hill above which towers the local museum, once the queen's palace. In the 17th century a king ordered 1,000 men to encircle the town in order to protect it; from this came the name Antananarivo, which means the town of a thousand men. Though inhabited, most of the houses are unfinished, as the Malagasy are very superstitious and believe that death enters a completed house. Red dominates—earth, houses, flowers—contrasting with the white *lambas* in which the people wrap themselves. There are many churches, and schools of medicine, administration, law, and art, an agricultural college, and other educational institutions, botanical and zoological gardens. Meat preserving is an important industry. Pop. (1951) 177,059, including 17,459 Europeans.

**Antarctica.** The circumpolar continent of the South. This, the sixth of the great land masses of the world, is not fully explored:

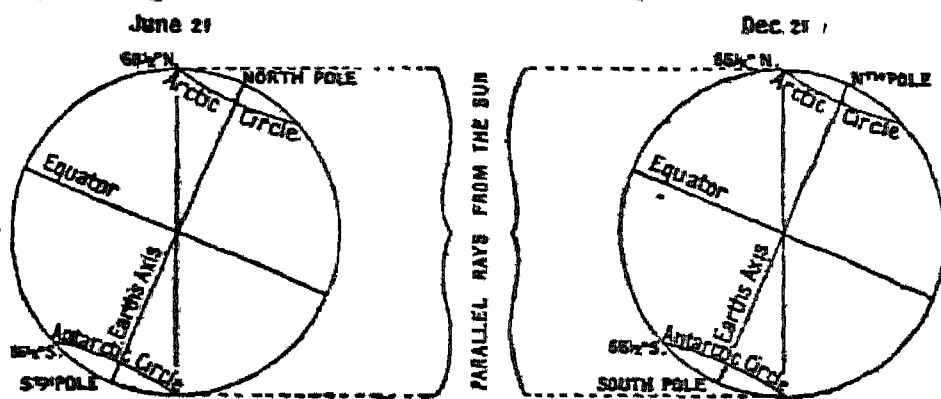
the Ross Ice Barrier, 840 m. from the Pole; at the N.W. corner of Ross Sea are the Balleny Islands, some 1,400 m. from the S. of New Zealand.

The coast consists chiefly of ice which changes in outline with the winds, currents, etc. This false coast forms, *e.g.* in the Ross Ice Barrier, cliffs which reach a height of 150 ft. The permanent land edge may be some miles behind the ice edge; the floating Ross Barrier, for instance, is fed by the glaciers some 400 to 500 m. from the open Ross Sea. Only about 4,000 m. are rock coast. Less than 10 m. from the land edge mts. frequently rise, as in South Victoria Land, to 13,000–15,000 ft., or 2,000–9,000 ft. above

the ice cap: these contain the true glaciers. Elsewhere the land rises less rapidly. Lt. Shirase, *e.g.*, attained a height of only 1,000 ft



Antananarivo. The capital of Madagascar. In the centre of Lake Anosy (foreground) is an island bearing a memorial to the dead of the 1st Great War



Antarctic and Arctic circles, showing how the sun's rays reach them in midsummer and midwinter

**Antarctic Circle.** Parallel of latitude drawn  $23\frac{1}{2}^{\circ}$  (approximately) from the South Pole. *i.e.* in latitude  $66\frac{1}{2}^{\circ}$  S.



## ANTARCTIC EXPLORATION

Admiral Lord Mountevans, K.C.B., D.S.O.

*This account of the various Antarctic expeditions is by Captain Scott's successor as leader of the expedition of 1910-12. See also the articles on the various lands and seas of the Antarctic regions and those on Amundsen, Byrd, Scott, Shackleton, and other explorers*

Exploration in the Antarctic may be said to date from Jan. 17, 1773, when Captain James Cook was the first man to cross the Antarctic Circle, in long.  $38^{\circ}$  E.; the farthest S. he then reached was  $67^{\circ} 15'$  S. in long.  $39^{\circ} 35'$  E. In the following Dec he reached  $67^{\circ} 31'$  S., and on Jan. 30, 1774, the ice prevented him from proceeding further S. than  $71^{\circ} 10'$  S. in long.  $106^{\circ} 54'$  W. The next great step forward occurred in 1819, when William Smith discovered what are now called the South Shetland Islands. In 1821 Bellingshausen, a Russian, discovered Peter I Island and Alexander I Land.

James Clark Ross in command of the Erebus and of a British Antarctic expedition; Commander F. R. M. Crozier was appointed to the Terror, the second ship of the expedition. In Jan., 1841, the two ships broke through the Antarctic ice pack and found open sea, and sailed onwards straight towards the S. magnetic pole, until stopped by land at Cape Adare with Mt. Sabine (10,000 ft.) in the distance. Ross discovered the Admiralty Mts., Possession Island, Coulman Island, Mt. Melbourne, Franklin Island, and finally the volcanic mts. Erebus and Terror, and Cape Crozier. East of the latter Ross

sailed along the edge of the Great Ice Barrier; he had made the first voyage beyond  $75^{\circ}$  S., and his name is attached to the great Antarctic bay which he discovered. The extent of South Victoria Land was first suggested by his discoveries. In each of the following seasons attempts were made by Ross to reach the high latitudes, the best effort being  $71^{\circ} 30'$  S. in the Weddell Sea in March, 1843. For thirty years after this no great progress was made.

On Dec. 21, 1872, the Challenger expedition sailed for the S., and on Feb. 16, 1874, the Challenger was the first steam vessel to cross the Antarctic Circle. No land discoveries were made, but the examination of the sea floor showed the presence of fragments of glaciated gneiss, granite, quartzite, etc., indicating the existence of the ice-bound continent of Antarctica.

King Oscar II Land was discovered by Larsen in 1893, his ship, the Jason, being the second steamer to cross the Antarctic Circle. In 1897 the Belgica sailed from Antwerp, under Adrien de Gerlache, with a company which included Roald Amundsen, Dr. Cook, and Henryk Arctowski; the ship was gripped by the ice in March, 1898, at  $71^{\circ} 30'$  S., and for the first time an exploration party spent the winter in the Antarctic. Borchgrevink led the Southern Cross expedition in 1898, and a party of ten wintered near Cape Adare on the mainland, while the ship went back to New Zealand; in 1900 the party were taken on board and the Southern Cross explored part of the Great Ice Barrier.

In 1901 R. F. Scott sailed in the Discovery and landed a party at



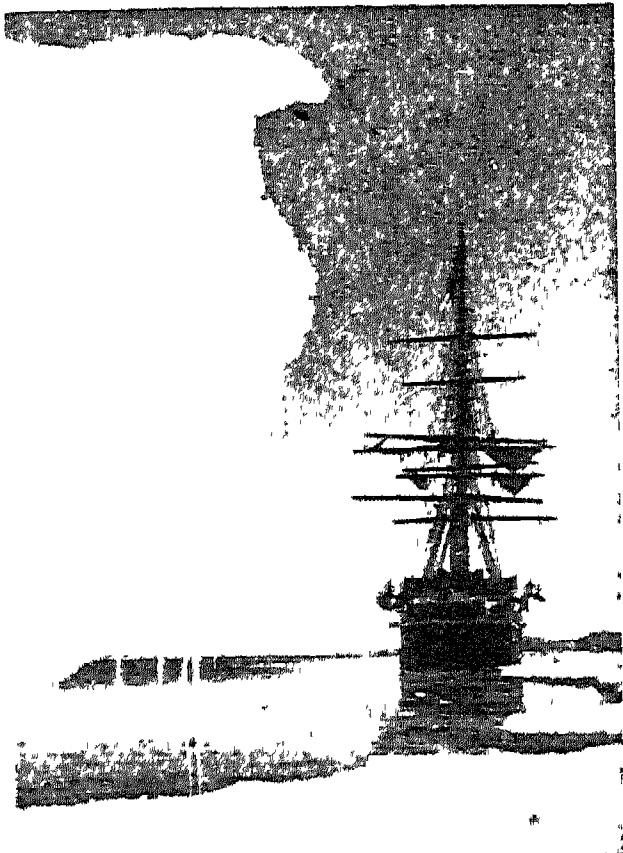
James Weddell, a Scotsman, reached  $74^{\circ} 15'$  S. in 1823, in the great bay to which his name has been given. Enderby Land was seen in 1831 by Biscoe, a captain in the service of the Enderby Brothers; the next year Biscoe discovered Adelaide Island, the Biscoe Islands, and Graham Land. John Balleny was sent southwards by the same merchants and discovered the islands which bear his name in 1839. A French sailor, D'Urville, made Adélie Land in 1840, and in the same year Wilkes, of the U.S. Navy, sailed along the coast of Wilkes Land. Although later explorers have found open sea in some parts of the area where he claimed to have found land, yet his discovery went a considerable way towards developing the idea that there was a continuous land mass to the S. of Australia.

In 1839 the Admiralty placed



Antarctic Exploration. Scott's expedition, 1910-12. The crew of the Terra Nova in their cabin. Above: Members of the Amundsen expedition taking observations close to the South Pole, Dec. 15, 1911

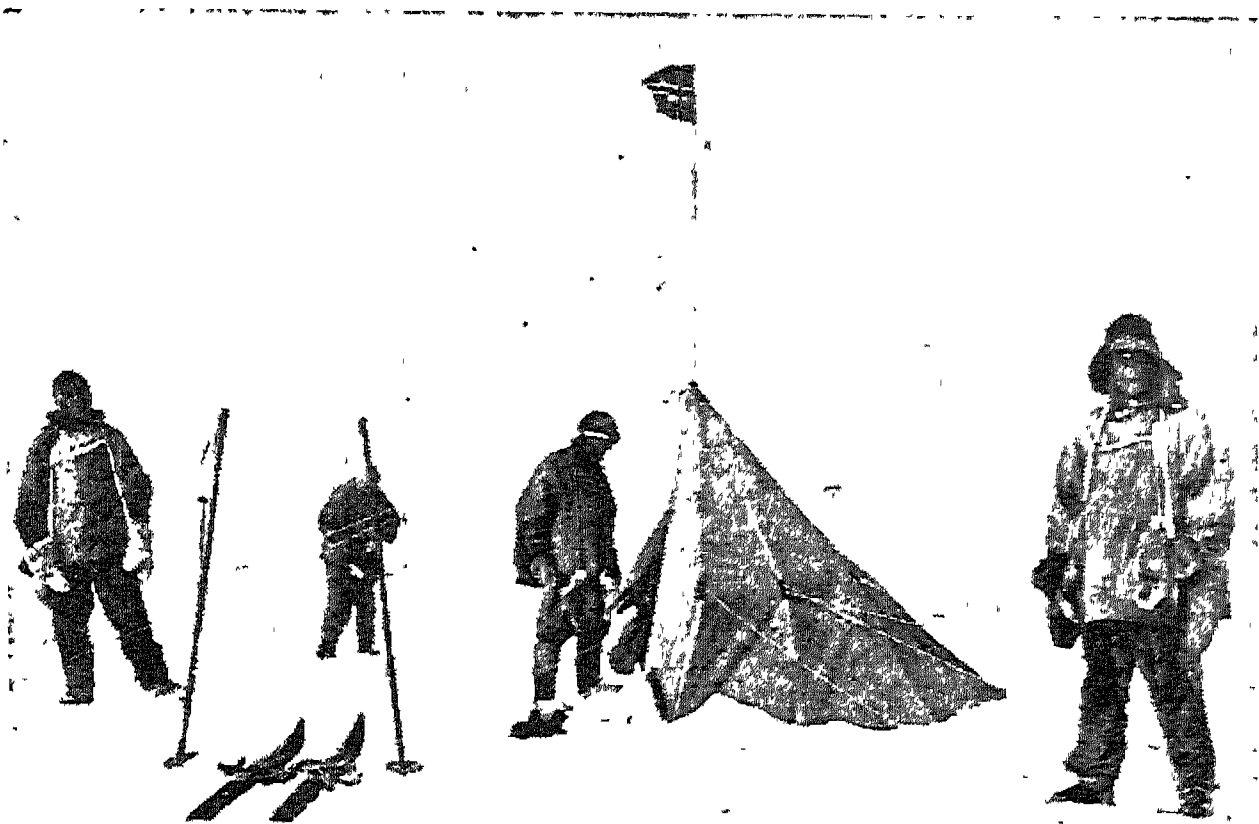
the foot of Mt. Terror on Ross Island on Jan. 22, 1902. The ship, before taking up her winter quarters, followed the Great Ice Barrier eastward and discovered King Edward VII Land. Winter was passed in McMurdo Sound, and next spring sledge journeys were made S. over the Barrier Ice. Scott led one party, which discovered Mt. Markham and reached  $82^{\circ} 17' S.$ , 370 m. from the ship, without being able to gain land to the S. or to set foot on the great S. extension of South Victoria Land, visible to the W. of the Great Ice Barrier. The Discovery could not be freed from the ice during the summer, stores were obtained from the relief ship, the Morning, and a second winter came on. The next spring Scott led an expedition due W. over South



Antarctic Exploration. Captain Scott's vessel, the Terra Nova, amid the polar ice Victoria Land and penetrated 300 m. from the ship. The Discovery was set free from the ice, and with the relief ships Morning and Terra Nova left the Ross Sea.

Drygalski sailed in the Gauss in 1901 from Hamburg, discovered Kaiser Wilhelm II Land, and wintered in the neighbourhood of the Gaussberg. Otto Nordenskiöld, in the Antarctic, reached King Oscar II Land, where he wintered. W. S. Bruce sailed in the Scotia in 1902 from the Clyde, wintered at Laurie Island, and in 1904, after refitting at Buenos Aires, the Scotia reached  $74^{\circ} 1' S.$  at Coats Land on the shores of Weddell Sea. Mossman remained for meteorological work until 1905 on Laurie Island at the station which had been established there. Charcot, in the Français, made explorations in Palmer Archipelago in 1903-4-5.

On New Year's Day, 1908, Shackleton, who had been with Scott on his famous sledge journey

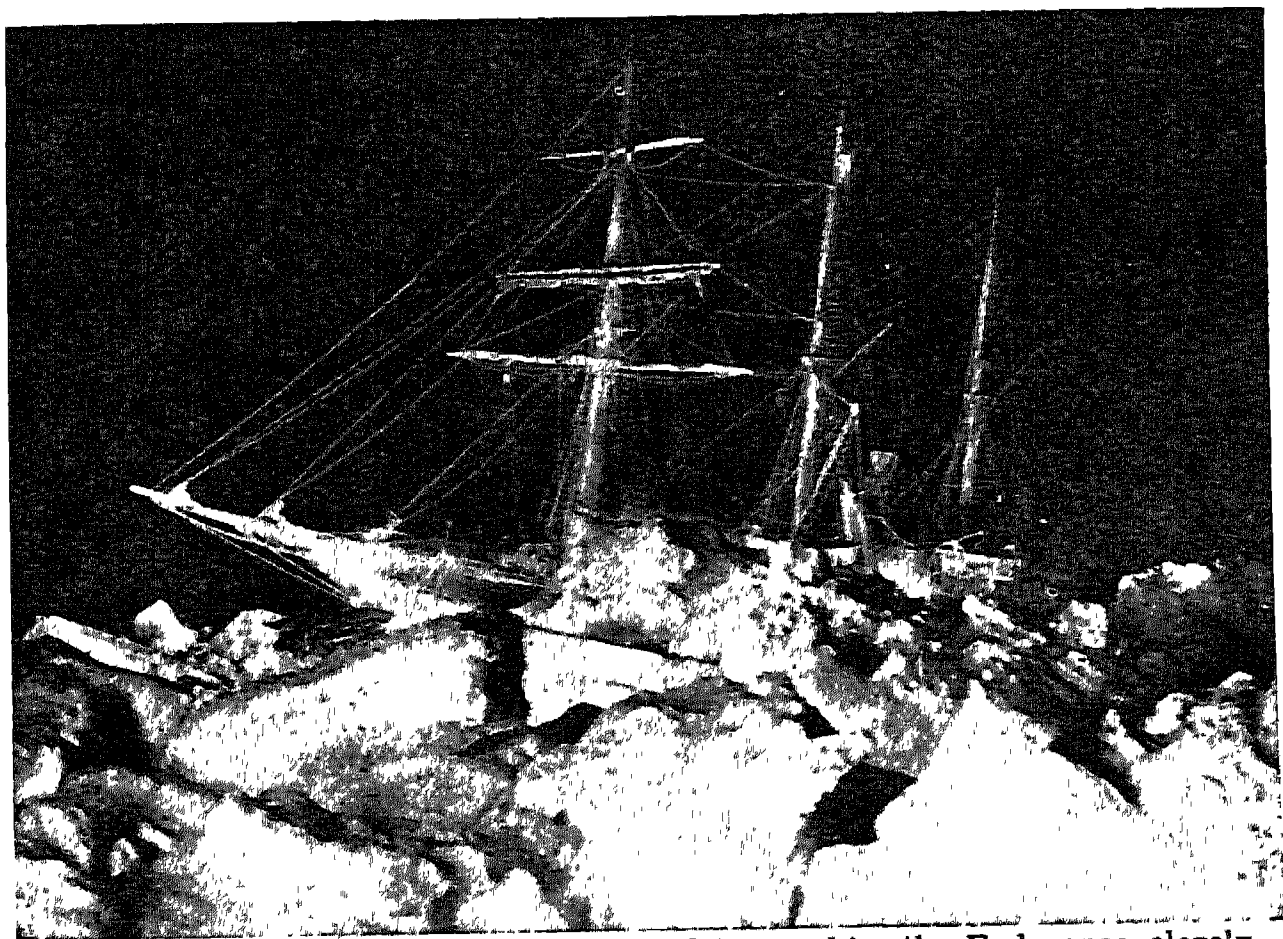


Antarctic Exploration. Captain Scott (left) and his companions discover the tent left at the South Pole by Amundsen, who had reached it 33 days earlier

over the Barrier Ice, left New Zealand in the Nimrod, and wintered near Cape Royds, the Nimrod returning to New Zealand. Mt. Erebus was ascended in March. He set out polewards over the Barrier Ice in Oct., climbed the Beardmore Glacier in Dec., and reached  $88^{\circ} 21' S.$  on King Edward VII Plateau on Jan. 9, 1909, an advance on the previous farthest S. of some 420 m. A second sledge party, led by Davis, pushed N., ascended the plateau near Mt. Bellingshausen, and discovered the South Magnetic Pole in  $72^{\circ} 25' S.$ ,  $155^{\circ} 16' E.$ , at an elevation of 7,260 ft., on Jan. 16, 1909. Charcot made a second Antarctic voyage in the Pourquoi-Pas? and explored Bellingshausen Sea in 1909-10. Charcot Land appears on the map to define his discoveries.

Roald Amundsen left Norway on the Fram in Aug., 1910, and reached the Bay of Whales on the edge of the Great Ice Barrier on Jan. 14, 1911; winter quarters were established, and the ship went back to Buenos Aires. The dash for the Pole began on Oct. 20. The inner edge of the Barrier Ice was reached on Nov. 17, at  $85^{\circ} S.$ , the Axel Heiberg glacier was climbed, and the Pole was reached on Dec. 16, 1911

Scott left London on the Terra Nova on June 1, 1910, winter quarters being prepared in Jan., 1911, on Ross Island. Sledge parties set out S. in Oct., and on Jan. 4 Scott and four companions, Wilson, Bowers, Oates, and Evans, went onwards from lat.  $87^{\circ} 35' S.$  and reached the Pole on Jan. 18, 1912. On the journey back Evans



Antarctic Exploration. Sir Ernest Shackleton's ship, the Endurance, closely beset by the floating ice and drifting northwards in 1915

From "South," by Sir Ernest Shackleton. London: William Heinemann



died at the foot of the Beardmore Glacier on Feb. 17. On March 17, his birthday, Oates walked out from the tent to save his three companions beset with hardship. Scott in his diary refers to Oates as "a gallant English gentleman." Scott, Wilson, and Bowers fought on, but were forced to camp by a terrible blizzard, and perished about March 29, 1912. Other members of the expedition made explorations near McMurdo Sound, Wood Bay, and Cape Adair. A small Japanese expedition led by Lieutenant Shirase, and a German expedition under Lieutenant Filchner, simultaneously worked and carried out minor explorations in the Antarctic while the Scott and Amundsen expeditions were in progress.

#### Mawson's Expeditions

On Dec. 2, 1911, Mawson sailed from Hobart in the *Aurora* to explore the area W. of Wilkes Land, taking about fifty Greenland sledge dogs as his principal transport. He discovered a new and extensive ice barrier, trending southward, which he followed and found to be attached to a new coast. This barrier rose to a height of 200 ft. Soon afterwards Mawson sighted a steep snow-clad promontory rising to 2,000 ft. He then made geographical discoveries just within the Antarctic Circle to the S. of the D'Urville Sea. New bays and capes were charted in 1912, and shallow ice-free water permitted him to set up winter quarters at Cape Dennison, in what he christened Commonwealth Bay. He set up a second base farther to the W., with Frank Wild in charge. It fell to Mawson to prove the non-existence of certain Antarctic lands placed on the sketchy maps in possession of the leading geographical societies of Europe and America by earlier explorers.

Extensive sledge journeys added vastly to geographical knowledge of Antarctica.

Mawson's men faced worse weather conditions than previous expeditions had met. Wind forces exceeded 100 m.p.h. Owing to the lateness of his return from his most important S.E. journey, which took him on to the 2,500-ft. plateau and resulted in the discovery of two huge glaciers, Mawson, after losing his two companions, missed the ship by 6 hrs., and had to face a second winter.

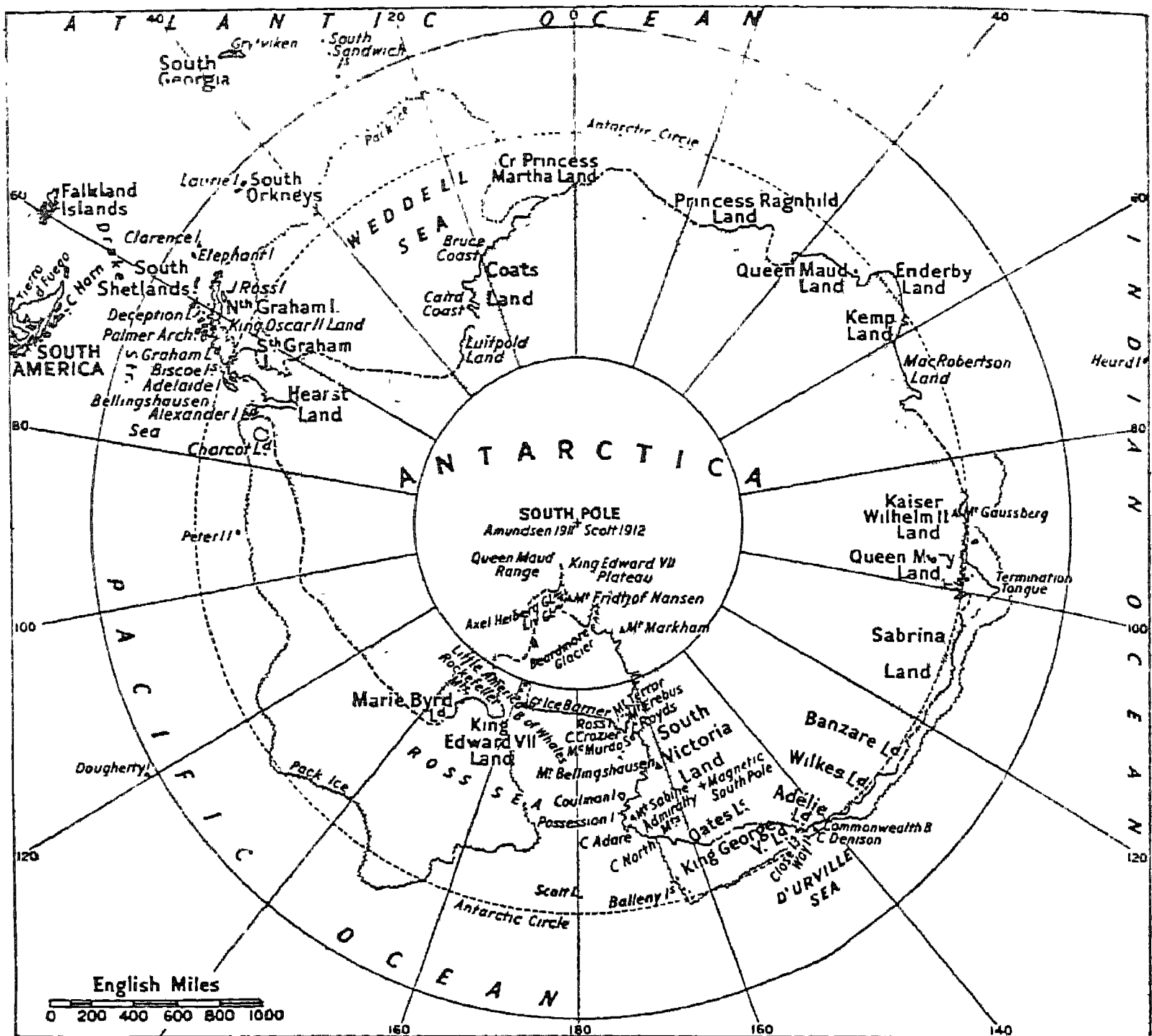
Capt. Davis, in the *Aurora*, found a gigantic ice tongue, 100 m. out of sight of the nearest land. It is known now as Termination Tongue, since its position lay in that assigned by Wilkes to his Termination Land. Davis also discovered an open sea which Mawson named after him. Other new lands were found, notably Queen Mary Land, where Wild's party was established.

Mawson again visited the Antarctic in 1930, and added to his Polar work by exploration in the vicinity of Enderby Land. Mawson's British - Australian - New Zealand Antarctic expedition is credited most justly with having added more geographical and scientific discoveries than any other.

Shackleton left England in 1914 in the *Endurance* to attempt a sledge journey from Weddell Sea across Antarctica to Ross Sea, where he arranged to be picked up by the *Aurora*. The *Endurance* was frozen in off the Caird Coast, Jan. 18, 1915, drifted from 76° 30' S. to 69° S., and there was crushed on Oct. 27, the crew reaching safety after considerable difficulty. Depot-laying parties left by the *Aurora* in the Ross Sea area were brought home in Feb., 1917. The trans-Antarctic journey was never made, but in spite of all that the expedition went through only three men were lost. Shackleton made an epic boat journey of 800 miles to South Georgia, where at the Norwegian whaling station he made plans which successfully brought about the salvation of the 22 members of *Endurance's* crew who had been marooned at Elephant Island.

Shackleton's final expedition of 1921 in the diminutive 125-ton motor vessel *Quest* was unsuccessful. His ship failed him, and he died Jan. 5, 1922, soon after the leaky vessel managed to crawl into Grytviken, South Georgia.

**FIRST ANTARCTIC FLIGHTS.** The U.S. explorer Richard E. Byrd, Sir Hubert Wilkins (Australia),



Antarctic Exploration. Map showing how the South Polar lands have been charted

and John Rymill (Great Britain) revolutionised the whole nature of Antarctic exploration. Great hopes were raised at the beginning of aeroplane flights in the Antarctic that fresh features would be noticed and photographic surveys used to chart mountain chains and tablelands, and, in fact, many inaccessible parts of the South Polar continent. These hopes were certainly realized.

Wilkins found a practicable landing-ground for aircraft on the shores of the great land-locked harbour of Deception Island. On Dec. 20, 1928, he flew south on the meridian of  $61^{\circ}$  W. across Graham Land to  $64^{\circ}$  S., and after ascending to 8,200 ft. was able to observe the mts., capes, and islands charted by the Scandinavians, Larsen and Nordenskjöld. He flew across the Antarctic Circle, and on to  $71^{\circ} 20'$  S.,  $64^{\circ} 15'$  W., taking important photographs.

The following summer season Wilkins pursued his explorations by air from the Discovery Committee's ship William Scoresby. On Dec. 29, 1929, he flew from the edge of the pack-ice at  $68^{\circ}$  S.,  $75^{\circ}$  W., over the Bellingshausen Sea down to Charcot Is., beyond  $70^{\circ}$  S. His final flight took him over pack-ice and bergs to  $73^{\circ}$  S.

#### Byrd's Expeditions

Richard E. Byrd had already gained a store of flying knowledge in the Arctic before he set out on his magnificent and costly South Polar enterprise. Money was no object; Byrd's two expeditionary ships City of New York and Eleanor Bolling alone cost the expedition nearly 300,000 dollars when fitted out and equipped. Byrd in his journal quotes the headlines of a contemporary newspaper: Million dollar expedition has magnificent equipment—costliest on record. By his results the expenditure was justified.

Establishing a base on the Great Ice Barrier, in the Bay of Whales, Jan., 1929, the City of New York landed the advance party with dogs, stores, and equipment. The Bolling came alongside three weeks later, and landed a Ford 3-engined aeroplane and three smaller machines. A landing ground was made, and Little America, Byrd's first-class base, was constructed. A base-laying flight was undertaken, and enough petrol and lubricating oil (with food, etc., for two months) placed in a depot on the Barrier at the foot of the Axel Heiberg Glacier, Queen Maud Range, to fly 500 m. home over the Barrier.

Ten important flights were made. The first extensive flight was to the E., Jan. 27, 1929, when Byrd, flying over King Edward VII Land, S. of Scott's Alexander Range, discovered a new range between  $78^{\circ} 14'$  S.,  $155^{\circ} 15'$  W., and  $77^{\circ} 35'$  S.,  $153^{\circ} 5'$  W., which he named Rockefeller Mts.

A second flight in the same direction was made on Feb. 18, and a further range was discovered E. of  $150^{\circ}$  W., running S.E. This range formed a boundary of some high land still farther E., which Byrd named Marie Byrd Land. This new land was again flown over and photographed for survey purposes. On March 7 Prof. Larry Gould flew to the Rockefeller Mts., landed in  $78^{\circ} 9'$  S.,  $154^{\circ} 27'$  W., and camped for 15 days for a geological survey.

Various sledge journeys were undertaken after the winter, including one made by the geological party from the Axel Heiberg Glacier base, for the establishment of W/T communications and weather reports, upon which the success of the Polar flight was so largely to depend.

The flight to depot stores and fuel at the Barrier base was made on Nov. 18, 1929. New mountains were seen, and named Bob Range. Byrd, after experiencing the most hazardous adventures imaginable, gained excellent experience, which was to help him immensely in the Polar flight itself. This he undertook on Nov. 28 and 29. Accompanied by Balchen, June, and McKinley, he reached the plateau by way of Liv Glacier. Flying on S. he circled the S. Pole and returned to the Barrier by the Axel Heiberg Glacier. Valuable photographs were taken on this journey.

On Dec. 5 another important flight to the E. of King Edward's Land as far as the  $145^{\circ}$  meridian resulted in the discovery of a range of mountains running N. and S. in  $144^{\circ}$ . This was followed from  $75^{\circ}$  to  $77\frac{1}{2}^{\circ}$  S. It was the N. extension of the Marie Byrd Mountains, and showed that the coast trended N.E., then after a slight bend turned S.

Byrd's airmen made two further flights, surveying the Bay of Whales from the air, and Gould's party completed their sledging expedition to Queen Maud Mts. and climbed 6,500 ft. up Mt. Nansen. This remarkable expedition left for New Zealand and home in Feb., 1930.

Byrd returned to the Antarctic in 1933 to complete his work, using the Bear of Oakland and the

Jacob Ruppert. Echo sounding from the Bear showed depths of over 4,000 metres in  $75^{\circ} 20'$  S.,  $148^{\circ} 15'$  W. Byrd had with him 55 men in what must now be called the village of Little America, where electric light and power, a broadcasting plant, tractors, aeroplanes, dog-teams, repair shops, a library and science hall, a dairy with three cows and a young bull-calf, and a mess hall seating 28 men, were to be found together with a variety of other structures and underground habitations. There was even a U.S. post office.

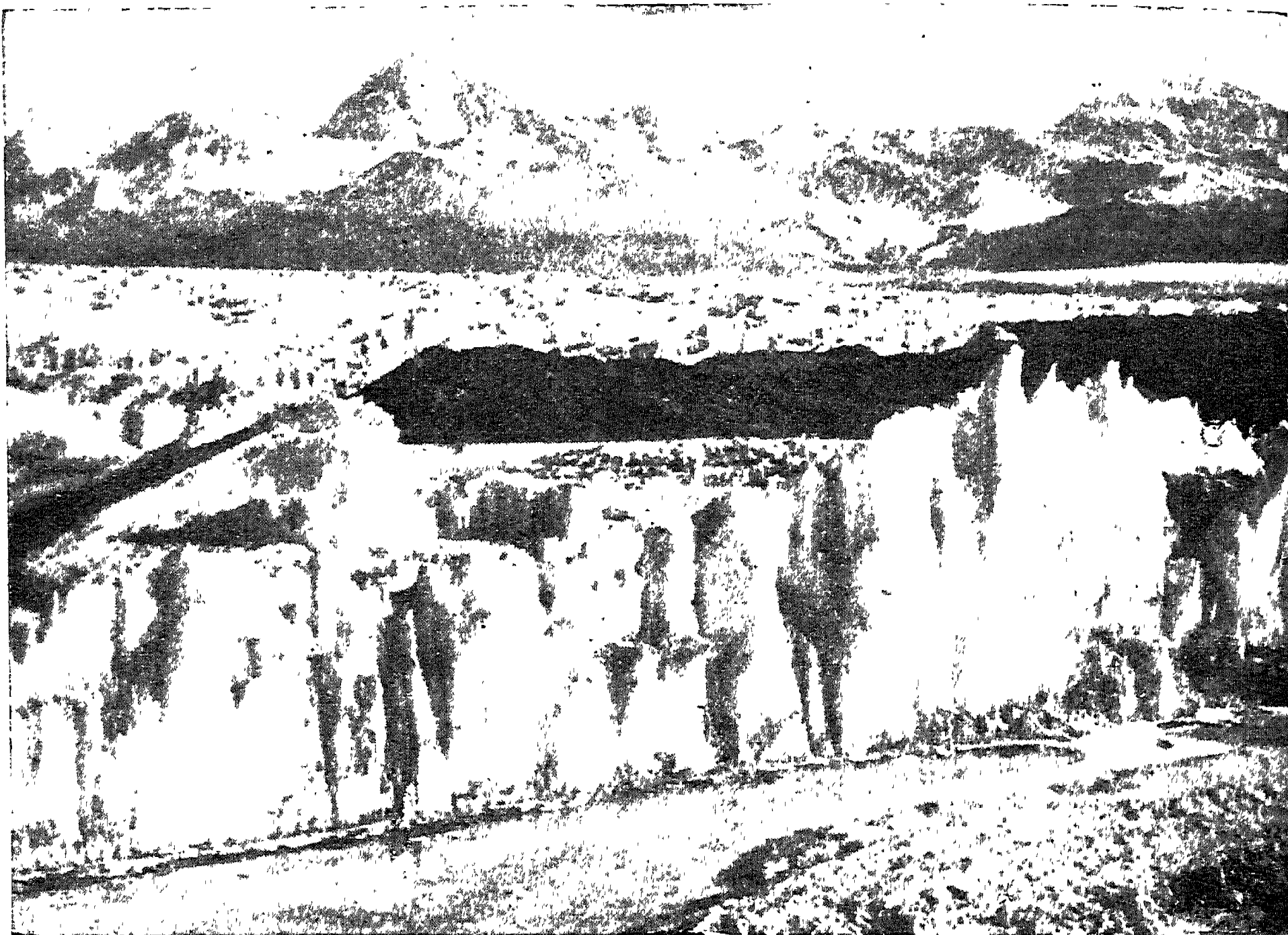
Tractor sledge parties established a depot 100 m. to the S. covering 50 m. a day, this being ten times as much as Scott's motor sledges could do.

A hut was erected 120 m. S. of Little America and furnished with supplies to enable one man to live through the winter. Byrd himself took on this duty, attending to the observations throughout this dark period. The minimum temperature experienced was  $80^{\circ}$  below zero. Byrd was in W/T communication with the base throughout his stay. When, in late winter, his messages became terse and irregular, a relief party set out to succour him. Arriving on Aug. 11, after a difficult journey, they found Byrd to be very weak and ill through poisoning from the fumes of his kerosene stove. For six weeks he had been too ill to prepare food, and he actually lived mainly in his sleeping bag in a half-frozen state, existing on the contents of tins stored under his bunk. Eventually he improved the ventilation, reduced the fumes, and made efficient use of his stove, after which his condition improved. During the whole of his stay until the arrival of the relief party he had managed to complete the meteorological and auroral observations. He was flown to the base Oct. 13, 1934.

Sledge journeys explored Marie Byrd Land and the Queen Maud Mts., using mainly dogs and tractors. The Queen Maud Range party were supported a month after their departure by a party in a Condor biplane. The party camped 182 nautical m. from the Pole, and discovered numerous new mountains and glaciers as well as beds of coal. Air flights made between Nov. 15 and 25 dispelled Byrd's belief that a transcontinental strait divided the Antarctic into two land-masses.

The Norwegian Riiser-Larsen set out in 1933 to explore the





Antarctic Exploration. The vast white south polar regions have an impressive beauty all their own. Here in the foreground are seen glacier and moraine, backed by towering cliffs, a high icy plateau, and mountains up to 15,000 ft.

Photo, Frank Debenham

sector of the Antarctic between Enderby Land and Coats Land (long.  $50^{\circ}$  E.- $30^{\circ}$  W.); but while he was establishing his base, the ice broke up, and the expedition has to be abandoned.

During 1933-34 another Norwegian, Lars Christensen, made a cruise in a whaling factory ship, and carried out meteorological, hydrographical, and geographical exploration. He had with him a Cirrus-Avian seaplane which made two short flights in lat.  $65^{\circ}$  S. and long.  $66^{\circ}$  E. A new line of coast was sighted stretching W. for 150 m., and named after Princess Astrid. Christensen completed the circumnavigation of the Antarctic continent, and reached lat.  $71^{\circ} 44'$  S., long.  $134^{\circ} 11'$  E. in the part of the Ross Sea which was at that time almost unexplored. Towards the end of his 70-day cruise, he discovered Sars Bank, S. of Cape Horn.

The American Lincoln Ellsworth planned to fly across the Antarctic from Weddell Sea to Ross Sea, 1934-35. Using a low-wing Northrop monoplane, he followed the east coast of Graham Land for 500 m., crossing a mountain range reaching 12,000 ft. (the Eternity Range), then an even higher range, which he named the

Sentinel Mts. Another chain was sighted on the S. horizon 100 m. away. Low visibility compelled him to land his machine, and make camp in  $79^{\circ} 12'$  S.,  $104^{\circ} 10'$  W. at a height of 6,400 ft., on a plateau named after Ellsworth's flight companion, Hollick-Kenyon.

The two fliers took off on Nov. 27, 1935, but were forced down four times more, the last occasion within a few miles of Little America, their destination. After four days in camp they dragged a home-made sledge to the abandoned huts of the Byrd expedition, where they arrived Dec. 15, to be rescued ultimately by Discovery II. This magnificent flight of 2,340 m. set a new standard for Polar aviation.

On the British Graham Land expedition, 1934-37, John Rymill worked in a previously unvisited part of Antarctica, and made two major discoveries: (1) that Graham Land is part of the Antarctic continent, not an archipelago as was previously believed; (2) that a great channel running approximately N. and S. separates Graham Land from Alexander Land. Rymill named this King George VI Sound.

During and after the 2nd World War, Antarctic exploration en-

tirely changed its character. No longer did small parties of heroic individuals make dashes for the Pole; instead large government-financed expeditions, working chiefly from the air, concentrated on survey and mapping. These activities were undertaken chiefly by the governments of the U.K., the U.S.A., and Australia, which established more or less permanent bases, from which exploration parties operated almost continuously. In 1947 Byrd commanded a new U.S. expedition of 4,000 men, 12 ships, an aircraft carrier, and squadrons of land- and seaplanes. It air-surveyed 125,000 sq. m., and discovered 4 bays, 15 islands, and many mountains, among them a range, 700 m. S.E. of Little America, rising to over 15,000 ft. Another U.S. expedition in 1947, under Finn Ronne, operating from Stonington I., Marguerite Bay, mapped 300,000 sq. m., and named an area W. of Weddell Sea Edith Ronne Land. Also in 1947 an Australian expedition carried out researches on cosmic rays and weather conditions from Heard I., 2,500 m. S.W. of Fremantle.

During 1949-52 a British-Norwegian-Swedish expedition, operating from Queen Maud Land,

found by air new ranges S.S.W. of the Kraul (West) Mts., and a deep bay in  $73^{\circ}20'S.$ ,  $17^{\circ}W.$  Their chief work was, however, geological; by borings and seismographical methods they attempted to discover where land underlay the ice, and also brought back specimens of both animal (mites) and vegetable (lichens) life, and fossils which indicated that the Antarctic was once a warm region.

From 1943 the British Falkland Is. dependencies survey maintained continuous exploration of Graham Land. The Falkland Is. and dependencies meteorological service was set up in 1950.

In Jan., 1955, an Australian govt.-sponsored party found an ice-free 100 mile-long mountain range, rising to 10,000 ft., between Mawson and the South Pole. In the same month Argentina established a base for exploration on Weddell Sea, 800 m. from the Pole. The British Falkland Is. dependencies survey planned an expedition for 1956-57 to cross the Antarctic continent from Vahsel Bay in Weddell Sea via the Pole to McMurdo Sound in Ross Sea.

**Bibliography.** Voyage of the Discovery, R. F. Scott, 1905; The Heart of the Antarctic, E. H. Shackleton, 1909; Scott's Last Expedition, ed. Leonard Huxley, 1913; The South Pole, R. Amundsen, 1913; With the Aurora in the Antarctic, J. K. Davis, 1919; South, E. H. Shackleton, 1919; Little America, R. E. Byrd, 1930; Antarctic Discovery, R. E. Byrd, 1936; Southern Lights, J. Rymill, 1938; The Antarctic Challenged, Lord Mountevans, 1955.

**Antarctic Ocean.** Name conveniently applied to the waters of the Atlantic, Pacific, and Indian Oceans which girdle the Antarctic continent. It is also frequently called the Southern Ocean. The arbitrary northern limit of the ocean is lat.  $60^{\circ}S.$ , where it merges with the Southern Ocean. The chief seas of the Antarctic Ocean are the Weddell Sea, between Graham Land and Coats Land; and the Ross Sea, between South Victoria Land and King Edward VII Land. The name Bellingshausen Sea is used for the waters to the W. of Graham Land and N. of Charcot Land. Except in the vicinity of Graham Land there are few islands in the ocean; the chief groups are the South Shetlands, South Orkneys, and South Sandwich Is., N. of the Weddell Sea, and the Balleny Islands, N. of Victoria Land.

The Antarctic is the shallowest of all the oceans, the depths

averaging 2,000 fathoms or less. One of the few deeps over 3,000 fathoms is the Ross deep in the Biscoe Sea, the area of which was proved by the researches of the Scotia to be much less than previously believed. A submarine ridge probably under 1,000 fathoms in depth connects Graham Land with South America via the South Orkneys, the South Sandwich Is., and South Georgia. There are less certain indications of a submarine ridge between Victoria Land and Tasmania. Evidence is lacking of former land connexions between Antarctica and S. Africa, but that part of the Antarctic Ocean has been even less adequately explored than others. The bottom deposits are mainly blue mud of terrigenous origin carried seaward by glaciers from Antarctica, and towards the northern limits of the ocean a band of varying width of diatom ooze, derived from the siliceous tests of the chief organisms of the surface waters. Surface water temperatures are under  $40^{\circ}F.$  throughout the year, and frequently fall to  $28^{\circ}F.$  Bottom temperatures range about  $31^{\circ}F.$

In winter the whole ocean is frozen or blocked with pack-ice: in summer the pack is loose, but invests most of the coasts. The salinity is low owing to the influx of fresh water from the wastage of icebergs and to the slight evaporation. The proportion of dissolved nitrogen and oxygen is high. Density, owing to the low temperatures, is relatively high. Near the continent there is a narrow zone of westerly current; this is turned northwards by the E. coast of Graham Land, and ultimately flows eastward. Surface organisms are mainly diatom and other lowly plants. In shallow water there is a wealth of invertebrate life; seaweeds are numerous. Fish are abundant, and various species of whales are found, source of a profitable industry. No trade routes touch the Antarctic Ocean, which is visited only by whalers and exploring vessels. See map p. 480.

**Antares** (Greek *anti*, compared with; *Arēs*, Mars). Giant red star at the heart of the Scorpion, known also as Alpha Scorpii. It is a double star of which the primary star, or sun, is of the first magnitude. It is one of the few stars of which the diameter can be directly measured by means of the stellar interferometer (*q.v.*). Its radius is 450 times that of the sun. See Scorpion.

**Anteater.** Popular name given to any of a number of almost unrelated animals united only by their common habit of eating ants or other insects. In all of them the teeth are reduced or absent, and because of this the name Edentata was used to denote most of them collectively. The group thus set up is a false one, and the use of the word should be discontinued. In Australia the spiny anteater (*Echidna*) is a relative of the duck-billed platypus, with which it makes up the group called the monotremes. These mammals



Anteater. One of the great anteaters, *Myrmecophaga jubata*, of S. America

lay eggs. Superficially *Echidna* resembles a hedgehog, but in detail it is very different. In Asia, and extending into Africa, is the scaly anteater, or pangolin (*Manis*), which looks like an animated fir-cone. Confined to Africa is the Cape anteater, or ant-bear, called in Dutch the aardvark (*Orycteropus*). It resembles a pig with a long tongue.

In S. America there is a group of animals fairly closely related to each other though remote from those already mentioned. They are sometimes called the hairy anteaters. They all have long thin tongues, and because of this the group is called the Vermilingua. The largest of them, about four feet long, is the great anteater (*Myrmecophaga*), found in tropical S. America. It is grey and brown in colour, with a bushy tail. It has powerful digging claws turned inwards, on which it walks awkwardly. The lesser anteater, or tamandua, is about half the size of the great, and has a tail like that of a rat. The two-toed, or pygmy anteater, about 6 ins. long, lives in trees like a sloth, in the hottest parts of S. America. It is reddish in colour, with a prehensile tail. It eats the contents of the nests of insects built in trees, whereas most anteaters dig for food.

**Antecedent** (Latin *antecedens*, going before). In logic (1) that part of a conditional proposition on which the other depends (if A is, B is); (2) the first part of an enthymeme. The latter is a



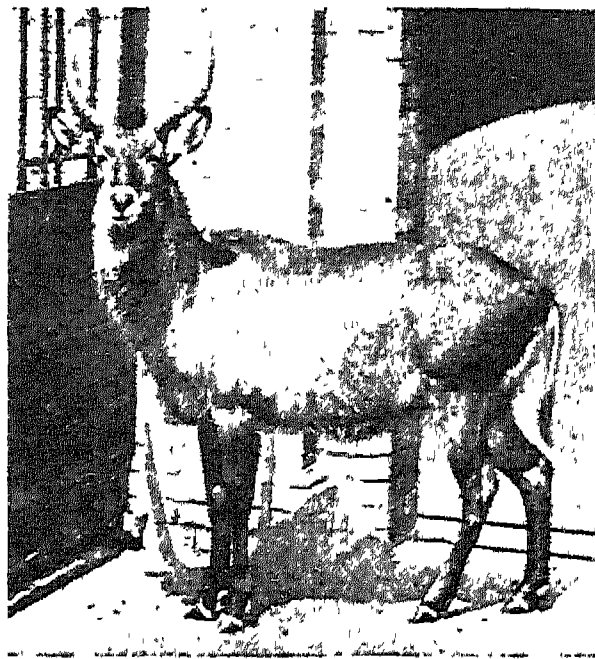
sylogism containing two propositions: "I think, therefore I exist," where the major premise "all that thinks, exists" is omitted.

**Antelope.** A large group of mammals of the family Bovidae. The term is generally applied to all ruminants that cannot well be described as cattle, sheep, or goats. Most antelopes are graceful and deer-like, bearing horns which are usually long, cylindrical, more or less ringed, and more solid than those of oxen, sheep, or goats. Antelopes usually have glands beneath the eyes, which never occur in cattle and goats.

All the numerous species of antelope are confined to the Old World, the so-called prong-horn antelope of America belonging to a separate family. Most are natives of Africa (e.g. hartebeest, gnu, bontebok, waterbuck and springbok, eland, gazelle), but a few are found in Arabia (hartebeest), India (blackbuck), Tibet (chiru), and Europe (chamois).

In size antelopes range from the eland (*Crias canna*), the males of which stand nearly 6 ft. high at the withers, to the royal antelope (*Namotragus pygmaeus*), which is only 10 ins. high.

**Antennae** (Latin *antenna*, sail-yard). The horn-like feelers on the head of insects, crustaceans, and



Antelope. *Cobus defassa*, a species which is native to Africa  
Photo, Gambier Bolton, F.Z.S.

certain other animals. Insects have only a single pair of antennae, but in crustaceans, such as the crab and lobster, the number is usually more. They are frequently of elaborate structure, as in some moths and gnats, and great care is taken to keep them clean.

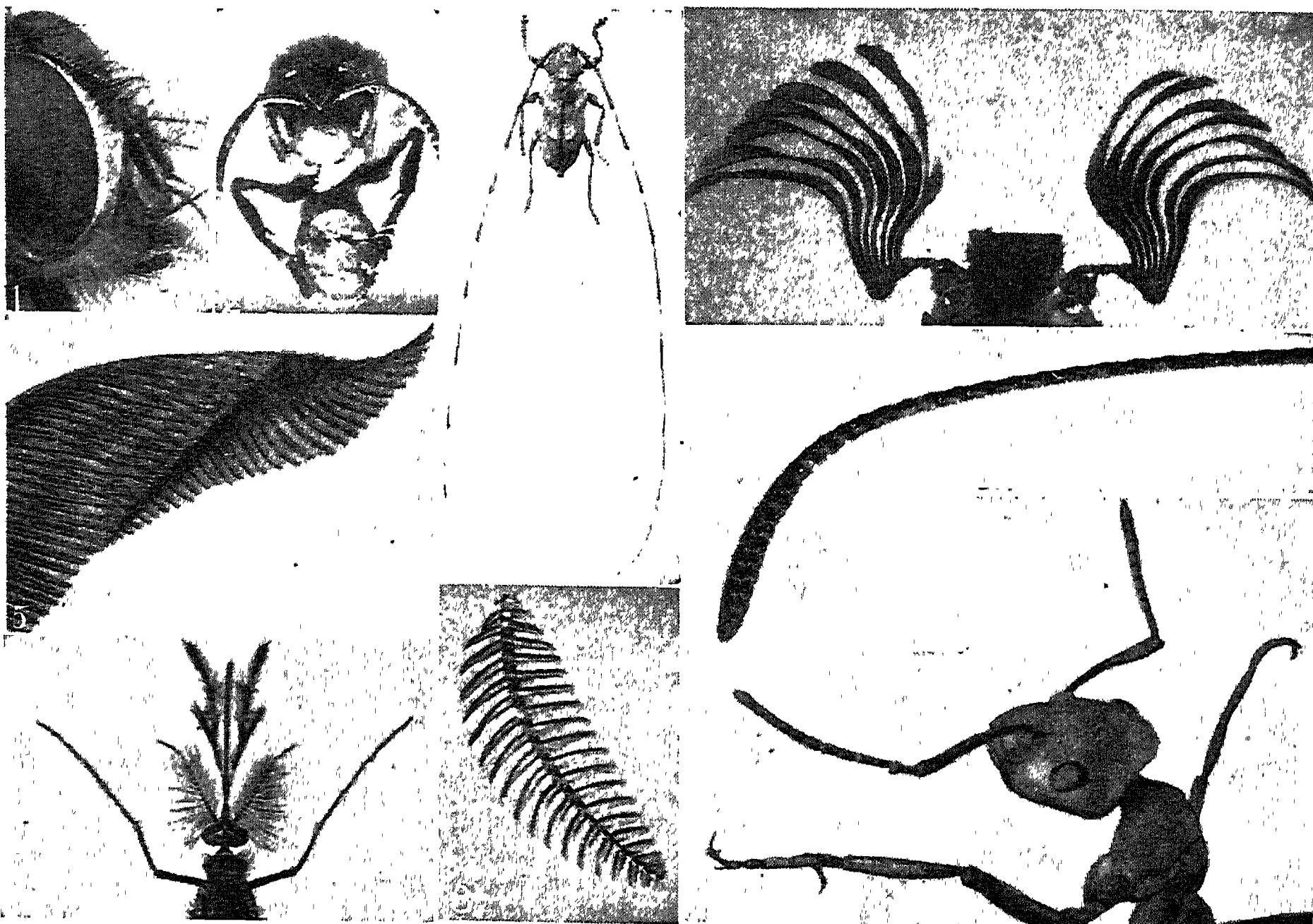
In the larval stage of certain crustaceans the antennae are used as swimming organs, but in adults and in insects they evidently perform sensory functions. Lobsters and crabs feel their way and possibly discover their food by their means, while ants appear to recognize one another and possibly communicate by means of these

organs. Two ants when meeting usually touch each other's antennae, which, it is thought, perform olfactory functions.

**Antequera.** Town of Spain, in Malaga province. Called Antiquaria by the Romans, it is 21 m. N.N.W. of Malaga, on the Algeciras-Granada rly., and has a Moorish castle and remains of the city wall. The Santa Maria arch, built partly of Roman masonry, dates from 1595. A trading centre, Antequera also makes chocolate, soap, and fertilisers. Near the town, which was taken from the Moors in 1410, is one of the largest grave-mounds in Spain. Pop. (est.) 23,500.

**Anthelion** (Greek *anti*, against; *helios*, sun). An image of the sun, or mock sun, seen at the same height as the real sun, but in the opposite direction. The phenomenon is due to reflection and refraction of light in minute ice crystals and is very rare. The word is sometimes used also for an entirely different phenomenon, the spectre of the Brocken (q.v.).

**Anthelmintic** (Gr. *anti*, against; *helmins*, worm). Medical term for a remedy which destroys or expels intestinal worms. Those preparations which destroy the parasites are known as vermicides, and those which expel them are



Antennae. Feelers of various insects (some highly magnified). 1. Antennae of the blow-fly. 2. Whip-like antennae of the hornet. 3. The long antenna of the North European timberman beetle. 4. Antennae of the male cockchafer. 5. Antenna of the silkworm moth. 6. Antenna of a butterfly. 7. Antennae of the male gnat. 8. Antenna of the male emperor moth. 9. Whip-like antennae of a worker wood ant. Great care is taken by insects to keep the antennae clean

called vermifuges (Lat. *vermis*, worm; *cadere*, to kill, and *fugare*, to put to flight).

**Anthem** (Greek *anti*, against; *phōnē*, sound or voice). Vocal music with sacred words, with or without accompaniment. It is peculiar to the Anglican Church, and though not part of the liturgy has an accepted place in Morning and Evening Prayer after the third collect. The development of the anthem in the Anglican Church as a musical form had no counterpart in the music of other Protestant churches. Full anthems are those sung by the choir, verse anthems those containing solo passages. The congregation takes no part in the singing of either. Composers who contributed to the development of the anthem included Byrd, Humphrey, Purcell, and Handel.

The word anthem is used loosely to mean song, especially one of praise or glorification, as in National Anthem (*q.v.*).

**Anthemion** (Gr. *anthos*, a flower). Type of ornament much used in ancient Greek architecture, as in the example illustrated from the Erechtheum. It is sometimes

colours in many flowers and fruits. Natural colour may be due to a single compound or to a complex mixture, and the final appearance will also depend on other factors, *e.g.* acidity. The anthocyanins are glycosides, and are therefore soluble in the aqueous sap of the plant. The portion of the molecule remaining after separation of the sugar is called anthocyanidin. These compounds will form, with acids, salts which are often red in colour; in neutral solution the colour is often violet or purple. Because of their phenolic nature, they form salts with alkali, their colour then being purple to blue. With some exceptions, the anthocyanidins can be divided into three classes differing in the nature of the phenolic fragment. Differences within these groups are due to methylation, and to the number and variety of the sugars. An example is cyanidin which is the anthocyanidin of the pigment, cyanin, the colouring matter of the cornflower, the rose, the dahlia, and other flowers.

**Anthology** (Gr. *anthologia*, a bouquet, from *anthos*, flower; *legein*, to select). Collection of selected poems or prose extracts. The oldest Chinese poetic anthologies date from the 4th century B.C.; Indian ones from a century later. The first Greek Anthology was formed in the 1st century B.C. by Meleager; in the

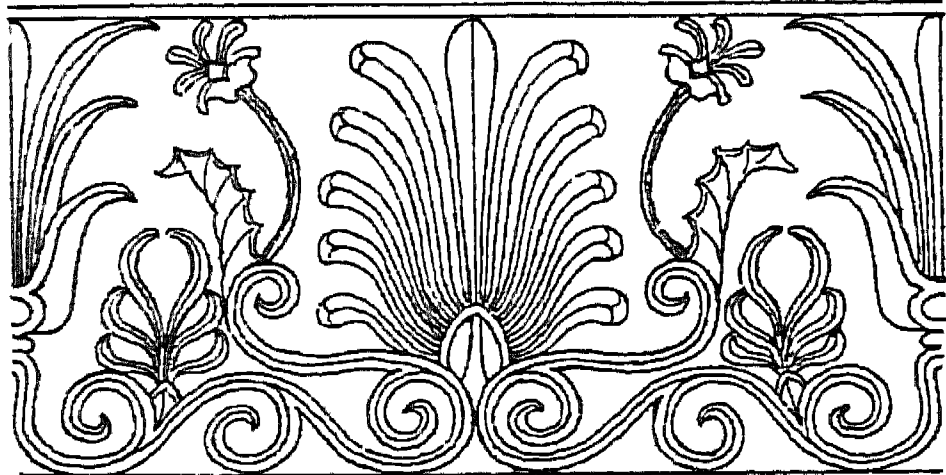
The first Latin Anthology (*Anthologia Latina*) was a collection of poems made by Octavianus of Carthage in 532–534 A.D. Joseph Scaliger issued a Latin collection, 1573; other Latin compilations were made by P. Burmann Secundus, 1759–73; Wernsdorf, 1780–99; and J. W. and A. M. Duff (with English translation), 1934.

Two outstanding anthologies of verse in English are *The Golden Treasury*, compiled by F. T. Palgrave with Tennyson's help in 1861 and several times expanded; and Sir Arthur Quiller-Couch's *Oxford Book of English Verse*, 1900, also many times reprinted, with later additions.

**Anthony OF PADUA** (1195–1231). Saint and preacher, most celebrated follower of S. Francis of Assisi. He was born on Aug. 15, 1195, at Lisbon of a noble Portuguese family, and entered the Order of Friars Minor (Franciscans) at the age of 25, after he had been for 10 years an Augustinian monk, the greater part of that time being spent in prayer and study. He was appointed by Francis to instruct the order in theology, but he was chiefly famous as a preacher in southern France. He died at Vercelli, near Padua, June 13, 1231, and was canonised by Gregory IX in 1232.

In the spirit of S. Francis, Anthony was the friend of all animals, not disdaining to preach to them on occasion. His help is popularly invoked for the recovery of lost goods, and his festival is kept in the R.C. church on June 13. The great church of Sant' Antonio (called Il Santo) at Padua contains his tomb. He is the patron saint of Portugal.

**Anthony OF THEBES** (c. 251–356). Saint and hermit recognized as the first Christian monk and founder of Christian monachism. Often called S. Anthony the Great, he was born at Koma in Upper Egypt of Christian parents. From the age of 20, he devoted himself to a religious life. He sold his property, gave the proceeds to the poor, and retired to a remote part of the Nile valley, where he lived as a hermit until 305. By this time his fame had spread, and many wished to live under his guidance. He therefore established the first Christian monastery near Memphis, which ultimately grew to a community of some 15,000 monks. The community of S. Anthony included a number of hermitages, the monks living in solitude in scattered cells, but observing certain rules in common, and owing



Anthemion. Example from the Erechtheum, Athens

incorrectly described as "honey-suckle" ornament, from its fancied resemblance to that plant, but is more probably a conventionalised rendering of the flowers of the *Acanthus* (*q.v.*).

**Anther**. In botany, the terminal part of the stamen, usually lobed, containing pollen sacs, in which the pollen is formed. The anther opens commonly by two longitudinal slits, occasionally by terminal pores, to shed the pollen.

**Antheridium**. In botany, the organ in which male gametes are produced in many lower plants. See *Algae*; *Bryophyta*; *Fungi*; *Pteridophyta*.

**Antherozoid**. In botany, a motile male gamete (as in the bryophyta and pteridophyta), also called a spermatozoid.

**Anthocyanins**. Pigments responsible for red, violet, and blue

10th century A.D. Constantine Cephalas made the great collection that has come down to the present day. In the 14th century a Byzantine monk, Maximus Planudes, expurgated and rearranged the Anthology, in a version printed at Florence in 1494 which remained the only one known until Salmasius discovered the original text of Cephalas at Heidelberg in 1606.

This great find, containing selections from 300 Greek poets, was removed to the Vatican Library after the Thirty Years' War, and to Paris after Napoleon's successes in Italy, but was returned to Rome in 1816. It was published by R. F. P. Brunck, 1772–76, and by F. C. W. Jacobs, 1794–1814, and has become the text drawn upon by all translators. There have been several translations into English of selections from the Greek Anthology.



obedience to the superior. In extreme old age Anthony travelled to Alexandria to oppose the Arians, but returned to his hermitage before he died in 356.

Anthony's temptations in the desert, the subject of a drama by Flaubert, and of more than one famous picture (including the Brueghel that inspired Flaubert), have no foundation in history. The main facts of his life are derived from the writings of S. Athanasius.

**Anthony, C. L.** Pseudonym used until 1935 by the British playwright Dodie Smith (*q.v.*).

**Anthophyllite.** Member of the amphibole group of minerals, a non-aluminous magnesium silicate containing some iron. It occurs either as prismatic, needle-like crystals, or as a fibrous variety called asbestos in commerce. It is found in certain metamorphic rocks, usually those derived from the alteration of basic or ultra-basic igneous types.

**Authorism** (Gr. *anti*, against; *horos*, definition). In logic and rhetoric, a counter definition, one differing from and counter to that which has already been stated.

**Anthozoa.** A large class of sessile marine animals belonging to the phylum Coelenterata. They include the sea-anemones and most of the colonial animals popularly called corals. Unlike the Hydrozoa anthozoa go through no medusoid stage in their life history.

**Anthracene.** Crystalline aromatic hydrocarbon isolated from coal-tar, and important as the starting material for a number of dyes. It was discovered in 1832 from the highest boiling fractions of coal-tar, but although it was of interest chemically its technical use was not recognized until it was obtained by the distillation of Alizarin (*q.v.*) over zinc dust. It was then realized that it was a potential source of dyestuffs. Anthracene,  $C_{14}H_{10}$ , is obtained from the "heavy" or "anthracene" oil of the tar distiller, which distils between  $270^{\circ}$  and  $360^{\circ}$  C. It is deposited, together with other compounds, as a solid cake, which is filtered under pressure and then purified. The dyes derived from anthracene are anthraquinones, and anthraquinone itself is prepared from anthracene by its oxidation with potassium dichromate in dilute sulphuric acid suspension, or by catalytic air-oxidation at temperatures above  $200^{\circ}$  C. in the presence of catalysts such as vanadates, chromates, or molybdates of various metals. Anthracene blues are anthraquinone dyes.

**Anthracite.** The highest quality of coal. True anthracite contains 93 p.c. or more of carbon and 6 p.c. or less of volatile matter in the coal substance when freed from water and ash. Commercially, coals with only 91 p.c. carbon and up to 10 p.c. volatile matter may be sold as anthracite, but these are properly called carbonaceous coals. See Coal.

**Anthraquinone.** Organic chemical compound which is the parent of a very large family of important dyes, amongst which are alizarin and many vat dyes. It is an aromatic compound obtained commercially by the oxidation of anthracene, or by synthesis from simpler molecules. The anthraquinone acid dyes are related to alizarin and are often described by this name although sometimes remote in structure from it. They will colour wool without mordants. One of the most important is Solway Blue B. The anthraquinone vat dyes include Violanthrone, Indanthrene Dark Blue BO, and Indanthrene Violet RT, the Algol Colours, and the Soledon Colours.

**Anthrax.** Disease affecting animals and human beings. It is a widely distributed, specific, infectious disease caused by the presence of the *Bacillus anthracis* in the blood. Carnivora, especially the dog, are relatively immune from anthrax. In Great Britain horses and sheep are rarely affected, the disease being most common in cattle and pigs. In cattle, cases usually occur singly. The disease is extremely rapid and death usually occurs in a few hours, with rapid decomposition. The temperature rises to a high point; there are progressive weakness, difficulty of breathing, and escape of blood from the external orifices. The spleen is greatly enlarged; hence the term splenic apoplexy in cattle.

Prevention of the disease is exceedingly important, since infection is most often due to germs on pasture. The body of an animal which has died from anthrax should not be dragged over a field, but should be buried promptly, unopened, in a deep pit; all straw and material known to have been in contact with the animal should be burned; yards should be thoroughly cleaned, and stalls and byres disinfected. People who have handled the carcass must thoroughly disinfect their hands, and clothes soiled with blood, etc., must be steamed or boiled.

Human beings usually become infected with anthrax as the result

of their occupation, *e.g.* skinning and dressing carcasses, carrying hides, or manipulating wool. The symptoms in human beings vary with the way in which the infecting organisms find an entrance to the body. When infection is through a cut or injury on an exposed surface, such as the hands, arms, or face, the result is the formation of a malignant pustule somewhat resembling an angry carbuncle. The tissues in the immediate neighbourhood become congested, and then inflammation may spread to the lymphatic glands, with development of fever and signs of general illness. Sometimes the symptoms go no further and the pustule gradually heals; more often the patient grows worse and dies from a generalised form of blood poisoning.

Among wool-sorters and workers in hair, infection is more often due to inhaling the bacilli, the effect of which is to produce a rapid rise of temperature, pain in the chest, hurried breathing and cough and bronchitis. Extreme prostration follows, and death may occur within 24 hours. Infection may also occur through the stomach or intestines, from eating the flesh or very exceptionally by drinking the milk of a diseased animal. Bleeding from the mucous membranes may follow, and death occurs with symptoms of intense poisoning.

Treatment of malignant pustule is to prevent a general infection; the pustule should be kept clean, but incision is not recommended. In man, large doses of penicillin, chlorotetracycline ("Aureomycin"), or oxytetracycline ("Terramycin") may be efficacious, and are sometimes given in conjunction with arsenical compounds.

#### A Notifiable Disease

In the U.K., a case of anthrax occurring in a factory or workshop must be notified to the factory inspector under the Factories Act, 1937. The Anthrax Prevention Act, 1919, forbids the import into the U.K. (except at specified ports and subject to conditions) of any goods infected or likely to be infected with anthrax. The Diseases of Animals Act, 1950, requires anthrax in animals to be reported to the police.

Anthrax is an industrial disease for the purposes of the National Insurance (Industrial Injuries) Act, 1946.

**Anthropoid Ape.** Any non-human mammal belonging to the super-family Hominoidea. See Ape.

**Anthropoidea.** One of the families of the mammalian order Primates to which belong the tailless, arboreal, true apes of the Old World, viz. gibbons, orang-utan, chimpanzees, and gorillas. See Ape.

**Anthropological Institute,** ROYAL. British learned society.

It is a union of the Ethnological Society of London, founded 1843, and the Anthropological Society, founded 1863. They were amalgamated in 1871 and given the royal title in 1907. The offices are at 21, Bedford Square, London, W.C., where there is a library.

## ANTHROPOLOGY: THE STUDY OF MAN

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*This article deals with the growth of man's activities in what are called prehistoric times. The companion article on Man should be referred to for the development or evolution of man himself. See also Archaeology; Bronze Age; Family; Society; Totemism, etc.*

The scope of anthropology, which is concerned with the study of man and his cultures, is so wide that it is of necessity compartmentalised. Three main divisions may be recognized, physical, cultural, and social anthropology, each with its own aims and methods. Terminology varies from country to country; in Continental Europe the general word anthropology refers only to what in the U.K. is called physical anthropology; what is social anthropology in the U.K. becomes sociology or ethnology in France. Each division contributes to ethnology, the general study of human groups, which in practice refers especially to primitive peoples.

**PHYSICAL ANTHROPOLOGY.** This, one of the biological sciences, is concerned with man's body. It attempts, by investigating in the light of biological principles the differences in physical form and bodily function among the various races inhabiting the earth, to understand the mode of their differentiation. In demonstrating man's relationship to the other members of the animal kingdom, it seeks to indicate the route along which he has separated from them, using the morphological evidence provided by fossils of extinct human and sub-human forms. Its ultimate aims are to discover the more important causal factors to which the pattern of human evolution may be attributed, to isolate their effects, and so to establish the general course of human evolution past and present.

Physical anthropology is closely related to the other biological sciences. From comparative anatomy and zoology, embryology and physiology, animal ecology and genetics, it draws its techniques and principles; the associated sciences of statistics and biometrics provide useful concepts and tools, while palaeontology gives comparisons in evolutionary chronology. Cultural anthropo-

logy provides a frame of reference for existing primitive man, and information on his history, traditions, and, with social anthropology, cultural peculiarities that influence his development and present evolution. Archaeology provides skeletal material, assists in its dating, and suggests from cultural evidence possible population movements. Clinical studies may show evolutionary processes at work in the population.

Methods include description by verbal means of qualitative characters such as eye colour; by methods involving measurement of characters amenable to quantitative treatment, such as stature or metabolic rate; by serological tests of characters such as blood groups; or by any of a battery of particular methods appropriate to the details under investigation. Descriptive aspects have been assisted by the use of photogrammetry for obtaining body measurements, the use of various chemical tests such as fluorine and radio-carbon analysis for dating fossil specimens, the discovery of many new blood groups and tests for their determination. Early emphasis on the importance of the descriptive approach was responsible for the definition of physical anthropology as a comparative study of physical differences. That this is only a partial definition is clear from consideration of the second stage, the interpretative, in which a functional or causal point of view is adopted and factors affecting the organism, or the particular characters under consideration, are examined.

### Genetical Factors and Environment

Genetical factors are responsible for the hereditary characters, manifest either as describable features, for example the ability to taste particular substances, or more usually as potentialities for development in the young form. Acting upon this genetic endowment are innumerable environ-

mental influences, which shape the potential into what is observed in the living form. Definition of the respective rôles of these two sets of influences is one of the major tasks confronting physical anthropology. A later stage is the experimental, in which hypotheses are tested in the laboratory under controlled conditions.

The findings of physical anthropology have practical applications: part of the descriptive data accumulated can be used to advantage in those situations where knowledge of the human form is required; for example, the placing of controls on machines in the anatomically correct positions for those who operate them leads to greater efficiency. Knowledge of the advantages given in a particular environment by the possession of a particular body character, implied where its possession can be shown to be due to natural selection, may be turned to account in instances where it is necessary to choose individuals for work under particular conditions.

**SOCIAL ANTHROPOLOGY.** This, one of the social sciences, is concerned with human societies, and in practice especially with primitive societies, though some studies have been made of civilized groups. It investigates the institutions of society such as the family and kinship systems, economic and political organization, religious beliefs, law and legal procedures, and their inter-relationships. It attempts to understand the social behaviour associated with each institution, the function of each in any given society, how they are interwoven.

### Ultimate Aim of Social Anthropology

Some authorities would go further, and maintain that its ultimate aim is to define the laws in social organization that are independent of place and period, that are common to all human groups.

The relationships of social anthropology are therefore with the other social sciences. Springing from "sociology," the science of society proposed by Saint-Simon (1760-1825) and named by his pupil Comte (1798-1857), it remains closely related to sociology but nevertheless differs from it in a number of ways; sociology deals with particular problems (*e.g.* divorce, crime, labour unrest) in modern societies, usually from documents, and its aim is not only to discover how institutions



function but how to modify them towards greater efficiency. Social anthropology studies societies as organic wholes, not isolated institutions of them; studies them directly, not from documents and statistics; and avoids attempting to modify their functioning. On the one hand economics, politics, and other social studies, and on the other psychology and (at one period) evolutionary studies have provided concepts; social anthropology in return has tested them in application to primitive groups.

#### Anthropology in the Field

The methods of study are peculiar to social anthropology. Alone among a particular people, the investigator endeavours to identify himself with them for a period of perhaps several years. He learns their language, their way of life, their outlook and sense of values, as far as it is possible for an outsider to do so. In the light of his training he then translates his experience into the terms of his own culture. After the descriptive stage, he resolves his accumulation of facts and impressions into a series of abstractions, attempting thereby to discover the structural order underlying the various social activities of the people he has studied. Such an abstract structural pattern is compared with that existing in other societies, to discover the reasons for variations and to extract basic sociological laws. The similarity of aim and method, though not of technique and emphasis, between social anthropology and history has been pointed out, the method of both lying in descriptive synthesis.

The large body of data collected by social anthropological research has obvious practical applications. The intention to administer a people according to local customs and laws requires, as a preliminary, knowledge of those customs and laws, and it is in the administrative sphere that social anthropological knowledge has been of greatest value. The administration is less likely to make unwise decisions if in possession of the facts; and the anthropologist is more likely to estimate correctly the repercussions of a particular administrative action.

**CULTURAL ANTHROPOLOGY.** This is concerned with the products of man's hands and brain. It studies chiefly the material, but also other aspects, of culture of human groups, again with especial reference to primitive peoples. Their tools and weapons, ornaments and

modes of decoration, habitations and dress; their technologies, crafts and modes of subsistence; their customs, rites, medicine and remedies are all topics of study. It is concerned with the objects and activities themselves rather than with the ideas behind them or the values placed on them. Attempts are made to classify peoples by their culture traits, and therefrom to explain existing distributions by movement of, or contact between, groups and by diffusion of traits from one society to another.

It is closely related to prehistoric archaeology, which studies the cultures of past peoples from the evidence of artifacts obtained in excavations, and which provides thereby a dimension of chronology. Linguistics provides specialist evidence of one aspect of culture of great value, and many classifications of peoples are essentially on linguistic grounds. Musicology and the study of folklore and oral tradition yield additional information. From cultural anthropology, ethnology derives its greatest contribution.

#### Value of Museum Work

In method, cultural anthropology makes more use of museum work than do the other branches of the study. Observations of technique and craftsmanship, by verbal description or cinematographically, and the collection of specimens among the peoples studied, are followed by detailed description and comparison at home. The experimental method has been extended to obtain understanding of primitive techniques.

**DEVELOPMENT OF ANTHROPOLOGY.** Anthropology takes its origins from the vagueness of folklore, the myths that all peoples possess concerning their past. Its inception as a serious study is traceable to the classical world. In ancient Greek philosophy, speculations on the origin of man and the nature of society played an important part. Herodotus (484-425 B.C.) was the first to apply the comparative method to human groups with his collection of facts concerning then known peoples at varying stages of civilization; their physical differences the Hippocratic school attempted to explain in terms of differences in habitat. Democritus (c. 360-357 B.C.) applied a dialectical concept of evolution, reasoning that accumulated experience was responsible for social cultures and that man's superiority over other animals was due to his capacity for learning.

The tendency of Plato (c. 427-347 B.C.) and Aristotle (384-322 B.C.) to reason from their own social system led to a decline in the social aspects of human study; by contrast biological aspects were given a marked impetus by the observations of Aristotle (the first to use the word anthropologist, though in a sense very different from that of today); he recognized man's physical resemblance to the animals, and assigned him to a place among them, though his concept of fixity of form hindered developments after his day. Lucretius (c. 98-55 B.C.) foreshadowed later views in his elimination of divine intervention, and his recognition of man's dependence on external circumstances. After that, the study of man declined among classical writers.

From the 13th century onwards knowledge of extra-European peoples began again to increase. The *Historia Mongolorum* of John Carpini (1182-1252), describing the life and appearance of the Asiatic nomads; the travels of Marco Polo (c. 1254-1324) to China, and of Ibn Batuta (1304-1377) in Africa and Asia, marked the beginning of a stream of writings on hitherto unknown peoples, associated with the Great Age of Discovery and the spirit of inquiry of the Renaissance. By the 16th century the inhabitants of the Congo, the Americas, and some of the islands of the Pacific Ocean were known. The variety of the new-found folk posed questions concerning their origins and relationships to peoples known before.

#### Social Philosophers' Contribution

The variety of human societies gave rise to investigation of the nature of society by the great social philosophers of the 17th and 18th centuries.

The views of Montesquieu (1689-1755) foreshadowed those of the 20th century in that he envisaged all aspects of a society and its environment as being functionally interrelated. Hobbes, Locke, Rousseau, and Voltaire, to support their speculations, made use of the increasing amount of knowledge concerning primitive peoples; this included works by Dapper who, in 1686, was perhaps the first to attempt a functional explanation of customs; Laftau who held that primitive societies were stages through which civilization had evolved; Vico who argued against this view that civilization had developed by ebbing and flowing and not by an uninterrupted

advance; Bergier, pioneer of the animistic school, in *L'Origine des dieux du Paganisme*, 1767; and compilers such as Meiners, who published *Grundriss der Geschichte der Menschheit* in 1785. Answers to the biological questions were initiated on a firm observational basis by Tyson who in 1669 compared the anatomy of man and ape; by Linnaeus (1707-78), with his great taxonomic compilation; by Blumenbach (1752-1840), who founded the study of craniology.

#### Influence of Darwin

Darwin's work, *The Origin of Species*, 1859, gave impetus to all aspects of anthropology. It made possible acceptance of the anatomical evidence for man's origin and led to recognition of the newly discovered Neanderthal man and initiation of the search for other forms. The antiquity of Palaeolithic man appeared feasible and the evidence of stone implements acceptable. In the field of technology Lane-Fox investigated the developmental aspect of human appliances. Bastian (1826-1905) conceived the importance of psychological factors in social institutions and attempted to apply to them developmental theories. Of social institutions, a number of more critical systematic studies were made; Morgan initiated the comparative study of kinship systems; McLennan demonstrated the widespread occurrence of exogamy, totemism, and the rite of marriage by capture, and, as did Bachofen, the frequency and importance of matrilineal societies; Tylor showed how widespread were animistic beliefs, Frazer magical beliefs, divine kingship, and various other institutions. The virility of the study was manifested in the foundation of numerous anthropological societies—Paris 1859, London, 1863, Berlin 1868, Florence 1871, Washington 1879, etc. Teaching of anthropology was instituted at Oxford in 1884, at Cambridge in 1900.

The beginning of the 20th century brought many changes. In the biological field the description of existing peoples by refined biometric methods gathered momentum, but the occurrence that was ultimately to have the most far-reaching effect on physical anthropology, the rediscovery at the dawn of the century of Mendel's work on inheritance, remained neglected by anthropologists for several further decades.

Discovery of the human blood groups occurred between 1900 and 1907; their anthropological significance was realized shortly after the First Great War. Primate palaeontology has been enriched by the finding of a great many important specimens, and their dating has been facilitated by improved geochronological methods. Descriptive morphological data are available for most of the major peoples of the world, genetic data (mainly serological) is to hand for very many, physiological data for a few.

In other fields the 19th-century evolutionary approach was attacked from several directions. In social anthropology some (Marrett, Lowie, Malinowski, Radin) tried to explain social behaviour in terms of individual psychology. It was Durkheim (1858-1917) who pointed out the inadequacies of this approach, and Levy-Bruhl (1857-1939) paralleled his analysis of social activities with the examination of the ideas associated with them. The diffusionist school originating with Ratzel and Frobenius in the study of material culture, criticised the evolutionary approach on the grounds that cultures borrowed many traits from neighbouring cultures and did not therefore move naturally and inevitably from previous stages; Graebner and Schmidt in Germany developed this approach very fully, while in England it was somewhat uncritically used by Elliot Smith, Perry, and Rivers; in the U.S.A. its use was rather more popular, giving rise to the culture-area concept of Nelson, Boas, and Wissler.

#### The Functionalist School

The functionalist school objected that the reconstructions of both evolutionists and diffusionists were guesswork and unprovable, and that social institutions are to be explained only in terms of the observable present, not the hypothetical past. Institutions are considered as interlocking components of a total social structure, in the whole functioning of which each has its own particular function. This point of view led to the divorce of social from cultural anthropology, which had profitably participated in the diffusionist development; traits of material culture are much more independent of each other than the systems of relationships which became the province of social anthropology, so that while cultural anthropology retained the com-

parative method for classification, social anthropology applied it, on a more restricted scale, to systems of relationships in an attempt to understand the reasons for individual differences. (*Consult Social Anthropology*, E. E. Evans-Pritchard, 1951; *A Hundred Years of Anthropology*, T. K. Penniman, 2nd ed., 1952.

**Anthropometry** (Gr. *anthropos*, man; *metron*, measure). Measurement of the human body. The term was first used in 1846 by Adolphe Quételet, the Belgian astronomer, who included the basic concept of the "average person" to typify the group in his writings on the statistical theory of probability. Before that date measurement of the human form was chiefly concerned with establishing rules of proportion for use in the graphic arts; such "canons" are known from ancient Egyptian times where for example the length of the middle finger was said to be contained nineteen times in the stature. Anthropometry was developed in the work of Charles Roberts (d. 1901), Sir Francis Galton (1822-1911), and Karl Pearson (1857-1936) in Great Britain, and of many investigators in other countries. Alphonse Bertillon (*q.v.*) evolved a system of measurements for the identification of criminals.

Technically, anthropometry deals with somatometry (measurements of the living body and its segments) and osteometry (measurements of the skeleton). Cephalometry (measurements of the head) and craniology (measurements of the skull) are important components of osteometry. Qualitative non-metrical characters such as hair and eye colour and form have usually been included in anthropometric descriptions as well as the quantitative metrical traits such as stature, weight, head dimensions, or skin thickness. Anthropometric instruments include graduated rods (anthropometers), calipers of different sizes and shapes, tapes, and weighing machines; attempts have been made to devise instruments to quantify non-metrical characters, to replace earlier hardly satisfactory matching scales.

Applications of anthropometry are several. The main development has been for the comparison of features of different human groups in racial studies. To problems of growth, nutrition, starvation, and of the relationship between psychological and physical features, anthropometry has



been applied. Practically, the performance of individuals of different physiques, anthropometrically determinable, under conditions of environmental stress such as heat and humidity is of significance in those industries where such conditions are encountered, for example in mining. By designing and laying out apparatus and controls, according to anthropometric considerations, increased efficiency of the operator can be secured in industry.

**Anthropomorphism** (Gr. *anthropos*, man; *morphē*, form). Term used for the ascription to God of a human form and qualities. Anthropomorphism represents a definite stage in the evolution of religion. In the earlier phases of religious thought the gods were construed in terms of the natural world, and the great forces of nature, *e.g.* the sun, the moon, the winds, the rainstorm were deified; this is sometimes called the zoomorphic stage.

It was a great advance when, owing to the influence of Babylonia, Egypt, and especially Greece, the gods were humanised and interpreted in terms of man's personality. The gods of ancient Greece represent anthropomorphism in its most pronounced form. They are men and women "writ large" and endowed with human passions and qualities on a grander scale. The Iliad of Homer may be described as the Bible of anthropomorphism. But though anthropomorphism is an intermediate stage in the development of religion, it is never its final goal. Even in ancient Greece it was superseded, in the philosophy of Plato, by a far nobler conception of God. Anthropomorphic elements in the O.T., which speaks of God as sitting, standing, walking, seeing, hearing, and speaking, and alludes to His eyes, ears, and feet, must be regarded as a survival of a primitive type of faith.

In its crudest forms anthropomorphism merits all the criticism that has been brought against it. "The lions," says Xenocrates, "if they could have pictured a God would have fashioned him like a lion, the horses like a horse, the oxen like an ox." "If a circle could think," writes Spinoza, "its God would take the form of a glorified circle." The case against anthropomorphism goes too far when Theodore Parker will not allow the statement that God "thinks" and Matthew Arnold will not allow that He either

"thinks or loves." The dehumanisation of God in some forms of modern philosophy is, indeed, a recoil to the other extreme. If man was created in the image of God, there must necessarily be points of contact and resemblance between the nature of God and the nature of man; and if this is granted, some form of anthropomorphism is inevitable.

The term anthropomorphism is also used to describe the tendency of men to interpret the activity of animals, and even things, as if they were endowed with feelings, desires, and thoughts similar to those of human beings.

**Anthropophagi** (Gr. *anthropos*, man; *phagein*, to eat). Peoples who ate human flesh, the nomad Scythian Massagetae dwelling to the N.E. of the Caspian, described by Herodotus and other classical writers; they consumed the flesh of old people.

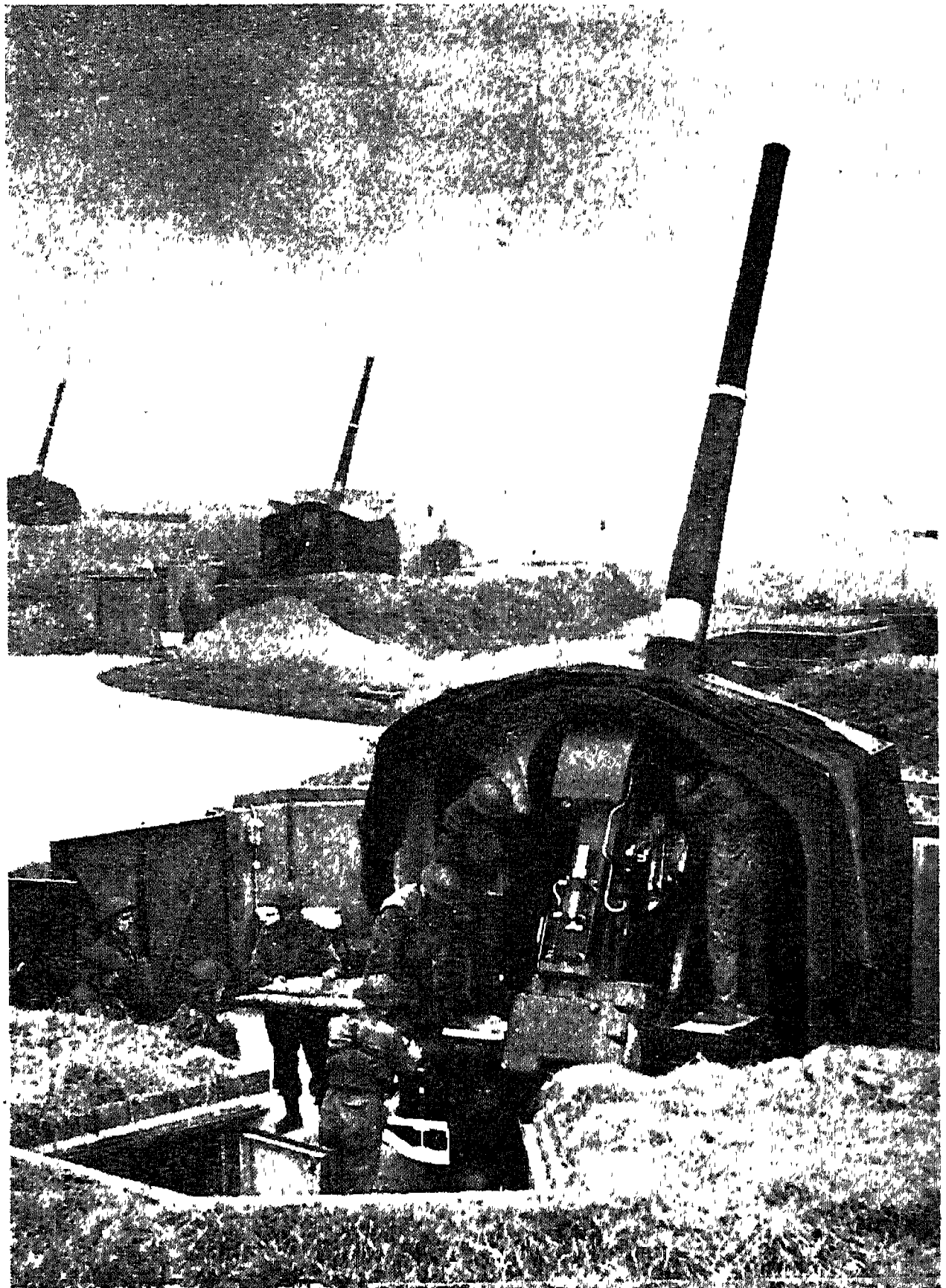
**Anti.** Tribe of South American Indian forest dwellers east of the

Andes in south Peru. They and the Chunchos are a warlike outpost of the Guiana Arawak. The Incas established them in Antisuyu. Of fine physique, they wear woven ponchos, are skilled in metal work, and practise simple agriculture.

#### Anti-Aircraft Command.

Unit of the British army formed on April 1, 1939, with Lt.-Gen. Alan Brooke (afterwards F.M. Viscount Alanbrooke) as c-in-c. In July, Gen. Sir Frederick Pile took over the command, and held it until the end of the Second Great War in Europe. When war broke out in Sept. A.A. Command had 695 guns of all calibres and 2,700 searchlights. Most of the guns were of 3-in. type equipped with Vickers predictor and No. 2 height finder. The searchlights had 90-cm. lamps and a sound locator. The defences were served by men of the Territorials.

By Sept., 1940, A.A. Command had deployed over the country



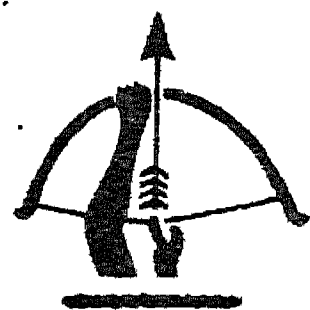
Anti-Aircraft. Part of a battery of 4.5-inch A.A. guns which helped to defend London against enemy bombers in the Second Great War

some 1,000 guns and 2,000 search-lights. Immediately the German air attack on London started on Sept. 7, guns were hurried to the capital from all over Great Britain. With the development of new gunnery techniques and new radar range-finding equipment, their effectiveness steadily improved, and during the winter of 1940-41 A.A. guns accounted for 80 p.c. of the enemy aeroplanes destroyed at night. The number of search-lights in service, also fitted with radar, increased to nearly 7,000.

As the need for men overseas increased, members of the A.T.S. served in A.A. Command posts, and from Jan., 1943, they were manned entirely by the A.T.S. (to a total of 74,000) and the Home Guard (142,000).

When the Germans began to bombard London with flying-bombs in June, 1944, more than 1,500 A.A. guns and nearly 500 rocket projectors were moved into a belt along the south-east coast; before the end of Aug. they were shooting down 70-80 p.c. of all

flying bombs entering their zone. Against the rockets discharged by the Germans from the Netherlands, A.A. proved ineffective; but before



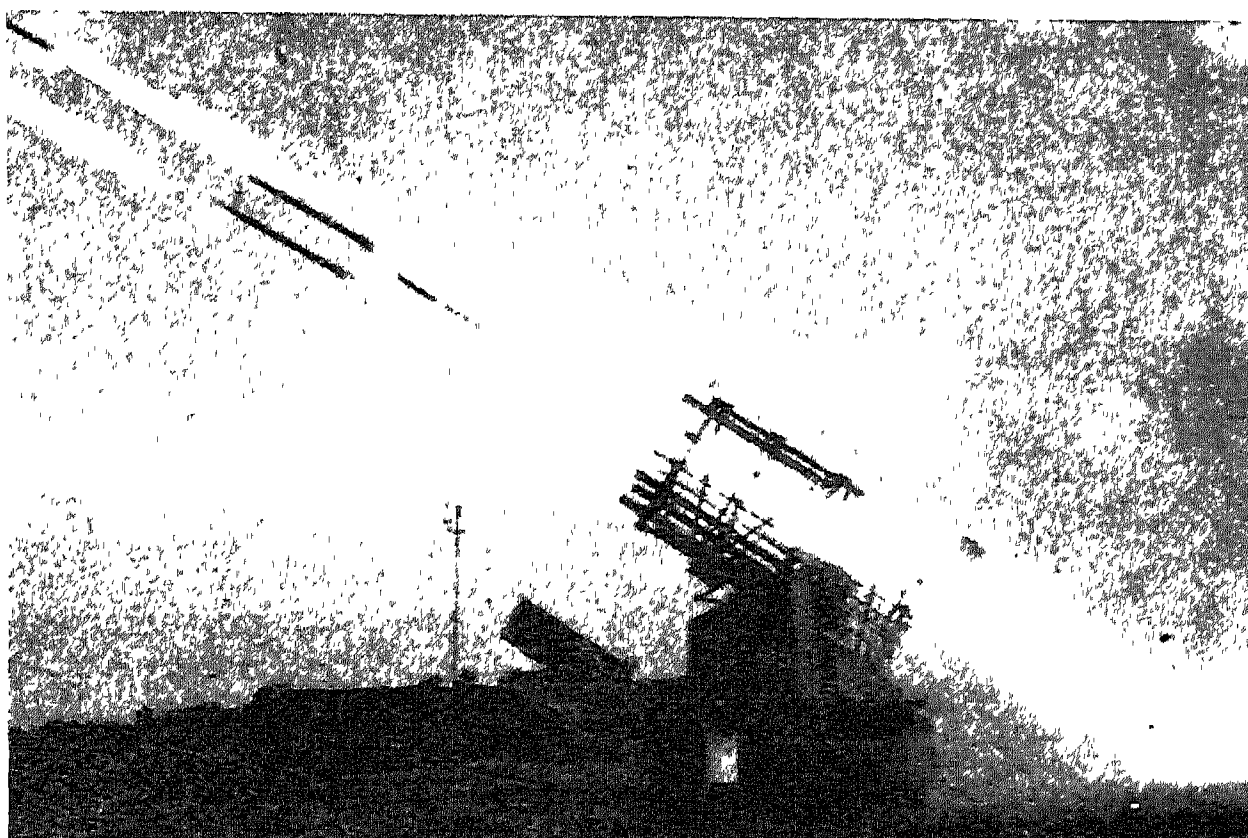
Badge of the  
A.A. Command

this bombardment ended radar had been developed which located the rockets on their journey.

The 3.7-in. gun was the main A.A. heavy armament during the war, reinforced by a high velocity 3.7-in. and by 4.5-in. and 5.25-in. guns. A.A. light guns were the 40-mm. Bofors and several types of 20-mm. gun. From early in 1943 rocket batteries, to a total of more than 1,000 twin rocket projectors, were deployed for the defence of all the main cities.

After the Second Great War, A.A. Command again became a Territorial unit until the development of nuclear weapons led to its abolition in Dec., 1954.

**Anti-Aircraft Weapons.** Defensive or offensive weapons designed to destroy attacking aircraft or to prevent their making a direct attack on a specific target. Defensive A.A. weapons include balloon barrages and smoke screens; offensive weapons comprise heavy and light high-altitude rapid-firing guns, and rockets and guided missiles. See Artillery; Guided Missiles; Rocket Weapons.



Anti-Aircraft. Rockets being fired from a multiple-barrelled A.A. weapon on a mobile mounting. When the projectile was fired, its passage to the target was punctuated by a series of secondary explosions as the successive charges ignited

Photo, British Official. Crown copyright reserved

**Antialcidas** (4th century B.C.). Spartan diplomatist and general. He persuaded Tiribazus, 392 B.C., and Artaxerxes II, 388 B.C., that Persian interests were closer to those of Sparta than to those of Athens. He arranged a Spartan-Persian alliance, blockaded the Hellespont, and forced Athens with her allies to agree to the peace which bears his name, 386 B.C., by which the Greek cities of Asia Minor were ceded to Persia. His last diplomatic mission to Persia failed and he committed suicide, 367 B.C.

**Antiarchi.** Group of extinct fish-like animals belonging to the class Aphetohyoidea (*q.v.*).

**Anti-Atlas.** Mountain plateau of S.W. Morocco. Its average elevation is about 10,000 ft. The Wady Draa is parallel to the S. face, which drops abruptly to the Saharan lowland; the W. end is Cape Nun. The plateau is separated from the Great Atlas by a depression of which the sea end forms the shore of Agadir Bay.

**Antibes.** Seaport of France in the department of Alpes Maritimes, 13 m. by rly. S.W. of Nice. A picturesque old town, the ancient Antipolis founded by Greeks from Marseilles in the 4th century B.C., it was later a Roman settlement. On the frontier of Savoy, it was fortified by Henry IV, the defensive works being extended later by Vauban; only the Fort Carré and the sea front remain. Napoleon Bonaparte, when a general, entrusted with the defence of the coast, brought his family here. The old house where Madame Laetitia and her children lived on the young general's scanty pay still exists. After the fall of Robespierre, Bona-

parte was imprisoned for a time in the Fort Carré. The 16th-century castle of the Grimaldis is a museum which contains Gallo-Roman antiques as well as pictures, drawings, gouaches, plates, and vases by Picasso. The chief industries are fishing and the making of perfumes from flowers specially cultivated in the neighbourhood. Pop. (1954) 27,064.

**Antibiotics.** Substances having a marked antibacterial action which are produced naturally by living organism, *e.g.* certain moulds; several are widely used in medical practice for the treatment of infections. The first to be discovered, and the best known, is penicillin (*q.v.*). Synthetic drugs with a similar action are called chemotherapeutics; but treatment either with these or with antibiotics is for convenience called chemotherapy.

As early as 1877, Pasteur (1822-95) and J. F. Joubert (1834-1910) reported that the anthrax bacillus would not grow in the presence of certain contaminating organisms which had developed in their media; the word "antibiosis" (against life) was used to describe this effect. During the next 50 years a number of other organisms with an antibiotic action on disease-causing bacteria were discovered and investigated; but attempts to make clinical use of substances produced by these organisms met with little success; the reactions in the body were apt to be much less marked than they had been in experimental cultures, and the medical profession lost interest in them. Even after (Sir) Alexander Fleming observed in 1928 the remarkable effects on



some bacteria of a mould identified as *Penicillium chrysogenum-notatum*, nothing effective was done to make practical use of the observation until war produced conditions of need that led to intensive research in this field, as in others, and to the isolation in 1940 by a group of scientists working at Oxford of the pure active principle concerned, which was named penicillin. Penicillin proved to have a high antibacterial value and a remarkable freedom from toxicity; but it was not effective against gram-negative bacteria or the viruses, and this stimulated search both in the U.K. and the U.S.A. for other antibiotics that would be effective against penicillin-resistant organisms. One large group of substances, consisting primarily of polypeptides (which are intermediate in complexity between proteins and amino acids), was found to be very active against

many bacteria. Unfortunately all except one are too toxic for inoculation; and administration by the mouth, which would be harmless, would also be ineffectual, for they would be broken down in the alimentary canal by the action of the digestive juices. They therefore had no practical value except for external use.

A large collection of other very diverse substances was also examined. Many resemble penicillin in their action against bacteria; but most of them produce unfortunate side-effects, varying in seriousness, and bacteria readily develop strains resistant to most of them. (Up to 1955 no bacteria had produced strains resistant to penicillin, with the exception of a few staphylococci.)

From all these other moulds, four substances of real clinical value emerged and were produced on an industrial scale. They are Streptomycin, Chlorotetracycline

(also called "Aureomycin"), Oxytetracycline (better known in the U.K. by the trade name "Terramycin"), and Chloramphenicol (trade name "Chloromycetin") (*q.v.*). Most of the bacteria and some of the rickettsiae and viruses which cause disease in man are susceptible to the action of one or another of these agents. Some infectious organisms, however, like those causing diphtheria and tetanus, produce their results by releasing poisonous substances into the body while they are alive. The application of antibiotics may then remove the cause of the poison (*i.e.* it will kill the bacteria and prevent the liberation of further poison), but toxin which has already been produced must be neutralised in other ways. In other diseases bacteria liberate toxins when they die, though not while they remain alive. When this happens the application of drugs to kill the bacteria will

## EFFECTIVENESS OF CERTAIN ANTIBIOTICS

DISEASE	ORGANISM	PEN	STM	CPL	CTC	OTC
Epidemic typhus	<i>Rickettsia prowazekii</i>	—	—	(++)	(++)	(++)
Typhoid. enteric fevers	<i>Salmonella typhi</i>	—	(+)	++	+	(++)
	<i>Salmonella paratyphi A</i>	—	(+)	(++)	+	(++)
	<i>Salmonella paratyphi B</i>	—	(+)	(++)	+	(++)
Dysentery (bacillary)	<i>Shigella dysenteriae</i>	—	(++)	(++)	(++)	++
Pneumonia	<i>Klebsiella pneumoniae</i>	—	(++)	++	(++)	++
Urinary infections	<i>Escherichia coli</i>	—	++	++	++	++
Whooping cough	<i>Haemophilus pertussis</i>	+	+	++	+	++
Respiratory infections	<i>Haemophilus influenzae</i>	+	(++)	++	++	++
Undulant fever	<i>Brucella melitensis</i>	—	(++)	++	++	++
Plague	<i>Pasteurella pestis</i>	(+)	(++)	++	++	++
Pyogenic and urinary infections	<i>Pseudomonas pyocyaneus</i>	—	(++)	—	—	(++)
Cholera	<i>Vibrio comma</i>	—	(+)	(+)	(+)	(+)
Gonorrhoea	<i>Neisseria gonorrhoeae</i>	++	++	++	(++)	++
Abscesses, carbuncles, etc.	<i>Staphylococcus aureus</i>	++	(++)	(++)	++	++
Pneumonia	<i>Diplococcus pneumoniae</i>	++	—	++	++	++
Scarlet fever, tonsillitis, erysipelas	<i>Streptococcus pyogenes</i>	++	—	+	++	++
Diphtheria	<i>Corynebacterium diphtheriae</i>	(++)	(+)	+	+	++
Wound infections (gas gangrene, tetanus, etc.)	<i>Clostridium welchii</i>	++	—	—	++	++
	<i>Clostridium tetani</i> , etc.	++	—	—	++	++
Tuberculosis	<i>Mycobacterium tuberculosis</i>	—	++	—	—	+
Leprosy	<i>Mycobacterium leprae</i>	O	(++)	O	O	O
Syphilis	<i>Treponema pallidum</i>	++	—	++	++	++
Yaws	<i>Treponema pertenue</i>	++	++	++	++	++
Jaundice (infectious)	<i>Leptospira icterohaemorrhagiae</i>	(++)	+	O	++	O

PEN = Penicillin  
STM = Streptomycin  
CPL = Chloramphenicol

CTC = Chlorotetracycline  
OTC = Oxytetracycline

++ = Effective clinically  
(++) = Sometimes effective clinically  
(+) = Sometimes active *in vitro*

+ = Active *in vitro*  
— = Inactive  
O = Unknown

result in an acute toxæmia, and it is essential that the infectious agent should be disposed of in stages, or that precautions should be taken to neutralise the effects of the poison.

The way in which antibiotics produce their effect is not well understood, though some conclusions have been reached. In laboratory test tanks, penicillin is lethal only to growing bacteria; those which are not actively growing are merely inhibited. If the drug has similar effects in living tissue, then it cannot eradicate the causative organism of a disease unaided; the natural defences of the body (phagocytosis and antibody formation) must also assist. Thus application of chemotherapy to elderly people whose vitality is at a low level is often much less than to younger patients whose natural defence mechanisms are functioning efficiently. The principle underlying the action of chemotherapeutic agents is probably competition with the infecting organism for substances that are essential to metabolism. The resulting breakdown or blockage of one or more cellular enzyme systems of the microbe causes its death, or prevents it from growing or multiplying. When organisms prove resistant, either the essential enzyme systems are not susceptible to blockage or disruption by antibiotics, or else the microbe may possess the power to inactivate or destroy the antibiotic. For instance, *Bacterium coli* synthesises an enzyme called penicillinase which destroys penicillin.

In an entirely different field, it has been found that for certain species of farm animals, notably pigs and poultry, the addition of small quantities of antibiotics to the food produces increased growth rate and more efficient utilisation of feeding stuffs, apparently without any ill effects. Consult Antibiotics, Sir Howard Florey, E. B. Chain, and others, 1949; The Clinical Application of Antibiotics (Penicillin), Sir Howard Florey, 1952; Antibiotics, Pharmaceutical Society of Great Britain, 1952.

**Antibody.** Modified serum protein which is produced by certain tissues (e.g. the lymphatic glands) of the higher animals and man in response to the introduction into the body of antigenic substances (see Antigen). Many different antibodies are known, their nature depending on the type of antigen which provokes antibody formation. Their importance lies in the fact that they will react chemically

with the antigens responsible for their manufacture. By reacting with the antigens of harmful organisms (e.g. bacteria), they can cause the death or inactivation of such organisms. Antibody formation is therefore the body's chief defence against micro-organisms causing infection or disease.

**Antichrist** (Gr. *anti*, against or in place of; *Christos*, Christ). Term used in the N.T. (1 John 2 and 4; and 2 John) to denote one who denies the truth of the Incarnation. Paul had already (2 Thess. 2) spoken of the "man of sin" who should precede the day of the Lord, and this man of sin is identified with the Antichrist. Allusion to the coming of false Christs may also be found in the Gospels (Matt. 24; Mark 13; Luke 21).

The early Latin fathers and many later commentators decided that S. Paul held Antichrist to be the main obstacle to the setting up of Christ's Kingdom on earth. That S. Paul meant by Antichrist a particular Roman emperor—e.g. Caligula or Nero—is a later interpretation not found before the 17th century. At the Reformation the papacy (not the person of the pope) was identified with Antichrist by Luther, Calvin, and Zwingli, and also by Cranmer, Latimer, Ridley, and other Protestant apologists. As late as 1861 Lutherans maintained that the papacy became Antichrist A.D. 607, when Pope Boniface III was entitled Head of All the Churches.

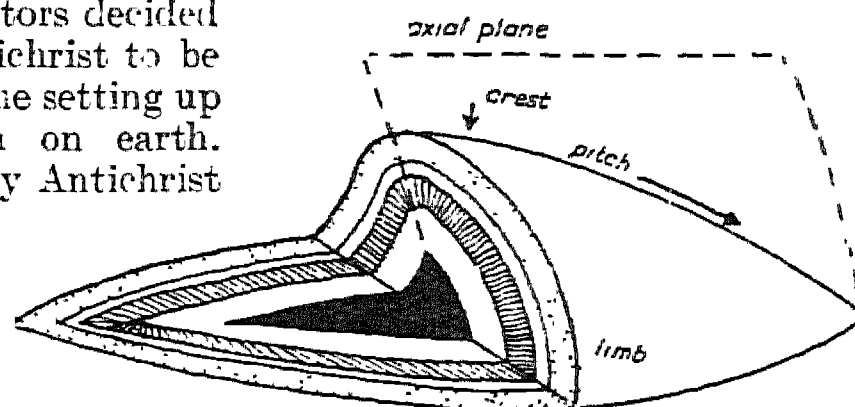
**Anticipation.** Term in English law. Formerly property could be given to a married woman in such a way that during the lifetime of her husband she could enjoy only the income; she could not sell or change the property. This was to protect her from squandering the property and so being left penniless, and also from being induced by the "kicks or kisses" of her husband to dispose of it for his benefit. Changing social conditions led to a change in the law. By acts of parliament passed in 1935 and 1949, all restraints on anticipation were abolished.

**Anticlimax.** Device in literary composition or rhetoric whereby emphasis of expression, conveying ever-increasing intensity, suddenly drops to an unexpectedly weak conclusion. For unintentional anticlimax, see Bathos.

**Anticline.** Geological name for an upfold of bedded rocks. The top of the arch of the upfold is called

the crest, and from it the two limbs of the fold incline downwards on either side. The oldest, originally lowest, bed of rock is found at the inmost part of the fold, wrapped round by successively younger layers. When such a fold is newly erected, by lateral pressure within the earth's crust, and then raised to form part of a land area, erosion of the fold first strips layers from near the crest, so that older rocks appear as a core surrounded by concentric layers of younger rocks.

An imaginary plane which bisects the angle between the limbs of the anticline is called the axial plane. When the axial plane is vertical the fold is symmetrical, when inclined the fold is inclined or unsymmetrical. When traced along the axial plane an anticline may die out, the limbs converging



together and inclining, or pitching, downwards, as in the diagram, so that the formation resembles an inverted canoe.

**Anticoagulants.** Substances used to prevent blood clotting or to help to disperse a clot, as in the treatment of thrombosis or during some surgical operations. The most favoured is heparin, the natural anticoagulant substance occurring in the blood of mammals and other animals. Substitutes for this are dextran sulphate, made from the complex carbohydrate dextran, a product of fermentation of milk, molasses, etc., by bacteria of the genus *Leuconostoc*; and synthetic dicoumarol, a substance originally found in rotting sweet clover and responsible for a fatal haemorrhagic disease in cows consuming excessive quantities of it.

**Anti-Comintern Pact.** Agreement directed against the Comintern (q.v.), the Communist International operating from Moscow. It was concluded Nov. 25, 1936, between Nazi Germany and Japan; Italy joined it on Nov. 6, 1937. The original signatories of the pact made an agreement to inform each other of the activities of the Communist International, to consult each other on the necessary protective measures, and to carry



out such measures in close co-operation. Other countries "whose permanent peace was menaced by the seditious work of the Communist International" were invited to join; and in 1939 Manchukuo, Hungary, and Spain accepted the invitation. After the Nazi-Soviet agreement of Aug. 23, 1939, was made, the pact was in abeyance, for its ideological basis had been removed; but after the German invasion of Russia, June 22, 1941, it was revived, and Nazi-dominated governments of Europe—Denmark, Finland, Slovakia, Croatia, Rumania, and Bulgaria—as well as the Japanese-controlled government in Nanking, signified their adherence. *See also* Axis.

**Anticosti.** Island of Canada. Situated in the Gulf of St. Lawrence, it is part of Quebec province, is 122 m. long by 30 m. broad, and has an area of 2,600 sq. m. The N. coast has limestone cliffs, the S. is low and dangerous. The island was leased in 1895 to M. Menier, a Frenchman, who developed it as a bird and wildlife sanctuary. It later became a sportsmen's reserve.

**Anticyclone.** Meteorological term for the type of pressure distribution in which the isobars form closed curves, and atmospheric pressure is highest at the centre and diminishes towards the margins. The movement of air is in the reverse direction to that in a cyclone or depression. Towards the centre of the system the air is usually still, but nearer the margins the winds—which are rarely more than light, since the pressure differences are not great, and therefore do not give such steep gradients as in cyclones—blow spirally outwards, in a clockwise direction in the northern hemisphere, in conformity with Buys-Ballot's Law (*q.v.*). In the south-

ern hemisphere the direction is in the opposite sense.

Anticyclones are generally regarded as bringers of fine or fair weather, and are marked as a rule by absence of rain, though in a land area surrounded by sea, *e.g.* the British Isles, drizzle is not uncommon, and appreciable rain may fall on and near the coasts. The almost cloudless anticyclone, with considerable range of temperature, predominates in the British Isles in spring and summer, the overcast or foggy one with usually small temperature range in late autumn and winter.

There are two extensive belts of anticyclones (approx. lat. 30° N. and 30° S.) which almost completely encircle the earth and are more or less permanent, moving slightly northwards and southwards with the sun. In general, the hot deserts lie in these regions. In the N. hemisphere in summer an anticyclone centres near the Azores and intermittently spreads as far as S. England; in winter the Siberian anticyclone is accompanied by intense cold and the fringe of it sometimes reaches England. In the S. hemisphere, anticyclones move steadily from W. to E. between the trade winds and westerlies.

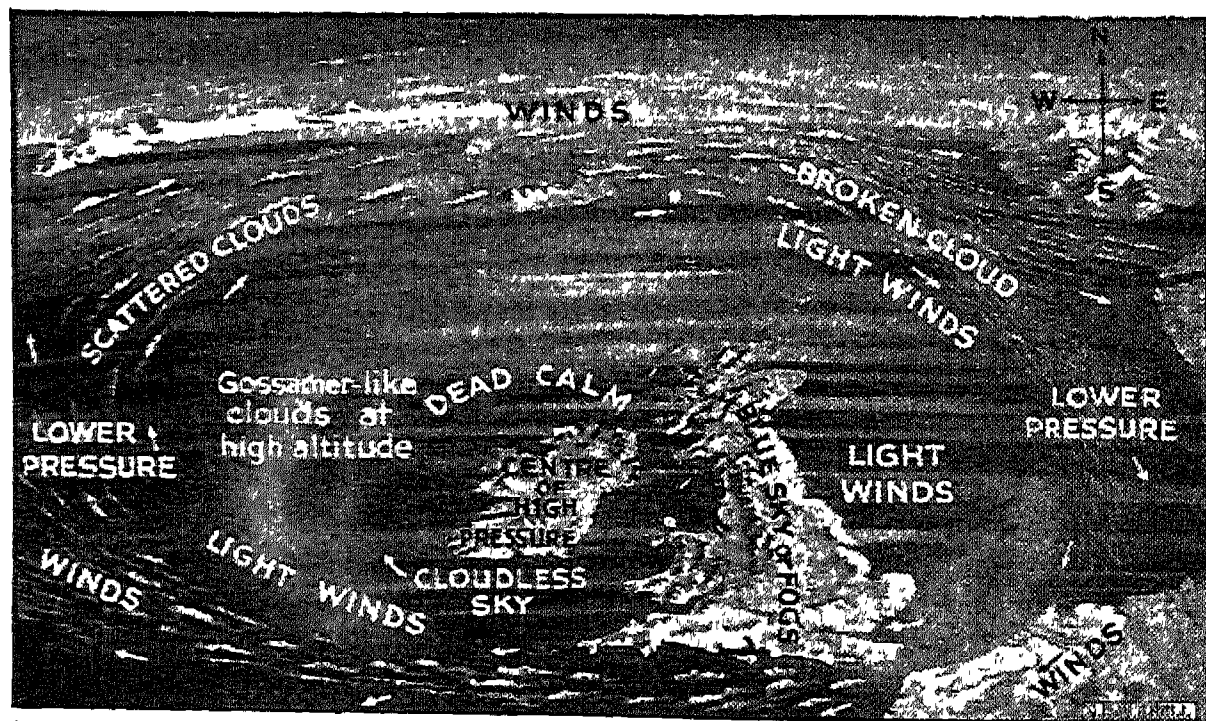
Normally the area covered by an anticyclone is larger than that of the average depression, and the rate of travel of an anticyclone is much slower. At times anticyclones may remain virtually stationary for 10 days and more. In an anticyclone, subsidence of the upper layers occurs gradually, the air becoming heated by compression, adiabatically, resulting in the formation of inversions of temperature. Two kinds of anticyclones may be distinguished generally; those that are cold and those that are warm. Cold anti-

cyclones are formed when air over a restricted area is cooled from below; they are relatively shallow as pressure decreases rapidly with height in cold air (*e.g.* the Siberian winter "high" is not usually detected above the 6,000 ft. level). Warm (*e.g.* sub-tropical) anticyclones are deep systems, and high pressure prevails far up into the atmosphere; although warmer than their environment at lower levels, they are actually colder in the stratosphere, which is higher and colder than the normal for the latitude and the time of the year. The excess of surface pressure in an anticyclone of this kind is thus due to the excess of cold, dense, relatively heavy air at high levels.

**Antietam.** River of the U.S.A. It rises in the Allegheny Mts. in Pennsylvania, and flows S. through Maryland to the Potomac. It was the scene of a battle, Sept. 16–17, 1862, during the Civil War.

**Antifreeze.** Substance added to liquid to prevent its freezing. It is used in the radiators of internal-combustion engines to prevent damage by frost. The most satisfactory anti-freeze substances are alcohol, glycerin, and ethylene glycol. All these are miscible with water in all proportions, and the addition of any one of them to water considerably lowers its freezing point. It is usual to add a rust inhibitor to commercial antifreeze fluids. The following figures show the percentage by volume of glycerin, ethylene glycol, and alcohol required to give protection from freezing at stated temperatures: *glycerin*, 32 p.c., + 10° F.; 40 p.c., 0° F.; 47 p.c., – 10° F.; 53 p.c., – 20° F.; 57 p.c., – 30° F.; *ethylene glycol*, 25 p.c., + 10° F.; 33 p.c., 0° F.; 39 p.c., – 10° F.; 45 p.c., – 20° F.; 50 p.c., – 30° F.; *alcohol*, 20 p.c., 0° F.; 40 p.c., – 22° F.; 60 p.c., – 56° F.

**Antigen.** A substance which, when accidentally or artificially introduced into the body of a human being or other animal, will initiate the formation of a special protein, the antibody (*q.v.*); this then reacts chemically with the antigen and so "neutralises" it. Antigens are usually proteins of high molecular weight, but a few other substances possess similar properties. A great many different antigens are known, each of which will initiate the formation of the specific antibody. Most antigens are attached to the cell membranes of bacteria and to almost all types of animal cells. When such a cell is introduced



**Anticyclone.** Diagram showing the principle of this type of pressure distribution, the vast body of air rotating clockwise and radiating outwards, as indicated by the arrows. Anticyclones are generally regarded as bringers of good weather

into another body, the "neutralisation" of the antigens by the antibodies will often result in the death of that cell. With bacteria and other harmful organisms this is clearly of the utmost importance.

Even within each species there are many different antigens—so many that in man and the higher animals each individual (with the exception of identical twins) has its own unique set. With very rare (and, when they happen, disastrous) exceptions, an individual will never produce antibodies against its own proteins. But when tissues are surgically transferred from one person to another, the production of antibodies will almost invariably be responsible for the death of the transplanted tissue. To overcome this hazard in blood transfusion, each donor is carefully selected to have the same blood group, *i.e.* the same red cell antigens, as the recipient.

**Antigonē.** In Greek legend, the daughter of Oedipus, king of Thebes. When her father, blinded by his own hand, had to leave Thebes, Antigone was his faithful companion until his death at Colonus. For her disobedience in burying the corpse of her brother Polyneices, which had been forbidden by Creon, king of Thebes, Antigone was immured in an underground cave, where she hanged herself. Antigone's tragic story is the subject of the Antigone of Sophocles, and she figures in plays by Aeschylus and Euripides.

**Antigonus** (c. 380–301 B.C.). General of Alexander the Great. On the death of Alexander in 323 the provinces of Greater Phrygia, Lycia, and Pamphylia were assigned to him, and after the death of Antipater in 319 he planned to make himself master of Asia. This led to a series of wars against the other generals of Alexander, and though by 306 Antigonus felt sufficiently sure of his position to assume the title of king of Asia, he was defeated and slain at the battle of Ipsus in Phrygia five years later.

**Antigua.** Island of the British W. Indies. It has an area of 108 sq. m. and is, with Barbuda and Redonda, one of the four presidencies of the Leeward Islands. It has a rugged and irregular coast, fertile soil, and several good anchorages, the best being English Harbour and St. John, the capital. It is an episcopal see and the seat of government of the Leeward Islands, and it produces salt,

cotton, pineapples, molasses, and rum. Discovered by Columbus in 1493, it was settled in 1632 by the British, by whom it was finally acquired in 1667. At English Harbour dockyard, built 1725 during the French Wars, Nelson lived 1785–87 when commanding the Leewards Is. station. Pop. (est.) 50,000.

**Antigua.** The former capital of Guatemala, 15 m. W.S.W. by road from Guatemala city. It stands at 5,000 ft. at the foot of three volcanoes rising to 13,000 ft. In 1773 almost every building but the cathedral was destroyed by an earthquake. Pop. (1950) 10,691.

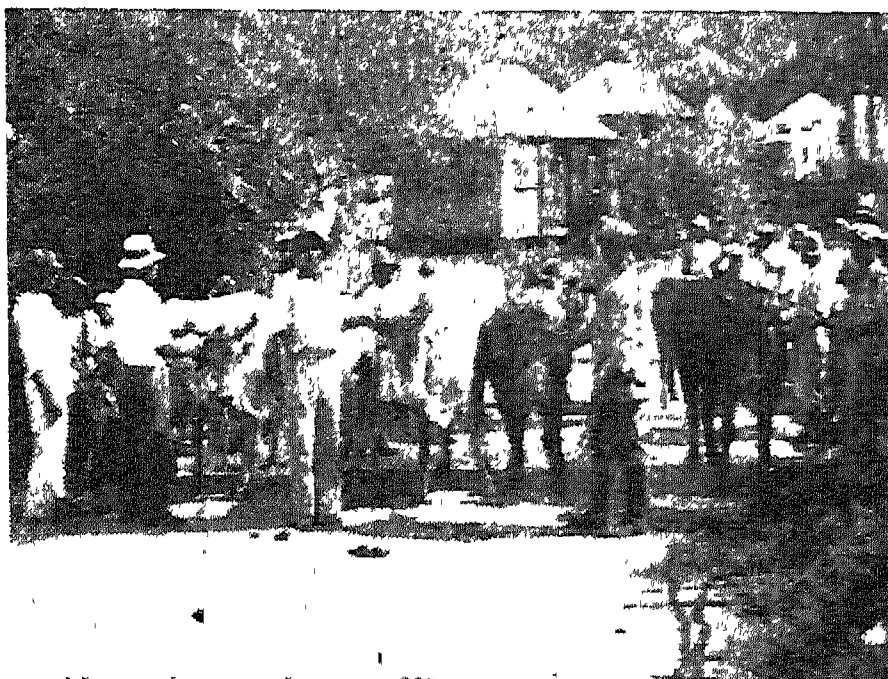
**Anti-Jacobin, THE.** Weekly newspaper, published for a few months in 1797–98. Its main object was to ridicule the democratic opinions of Fox and other Whigs. William Gifford was its editor, and its most brilliant contributor was George Canning.

**Anti-Lebanon** OR ANTI-LIBANUS. A mt. range of the Levant. Lying E. of, and parallel with, the Lebanon range, between Homs and Damascus, it is traversed by a branch rly. from the latter city to Beirut. The Anti-Lebanon extends about 90 m. and rises to some 9,150 ft. in Mt. Hermon.

**Antilles.** Name sometimes given to the West Indies, usually excluding the Bahamas. They are divided into two groups: the Greater Antilles are the four large islands of Cuba, Haiti, Jamaica, and Puerto Rico, with adjacent smaller islands. The Lesser Antilles include the Virgin Islands, the Windward and Leeward Islands, Guadeloupe, Martinique, Tobago, Trinidad, Curaçao, Aruba, and Bonaire. The last three, together with the small Dutch territories in the Leeward Is., form the Netherlands Antilles.

**Antilochus.** In Greek legend, son of the venerable Nestor. He accompanied his father to the siege of Troy, where he was killed by Memnon or by Hector.

**Antilogarithm.** In mathematics, the number which results when a base (usually 10) is raised to the power represented by a given logarithm. Thus, in the statement  $10^{.30103} = 2$ , .30103 is the logarithm of 2 and 2 is the antilogarithm of .30103. It is usual



Antigua, British West Indies. Antiguans with cattle bred from government owned sires

not to calculate antilogarithms for oneself but to consult tables.

**Antimony** (symbol Sb, Latin *stibium*). Metal having a bluish-silvery colour and a flaky crystalline structure, showing beautiful facets on fracture. It is a chemical element. Atomic no. 51; atomic weight 121.76; specific gravity 6.72–6.86; melting point 630° C. It volatilises at a white heat, but in a current of hydrogen distils readily. In a stream of oxygen or on ignited charcoal in air it burns with a brilliant white light, giving off copious fumes which settle in a fine dust (antimony trioxide), commonly described as "flowers of antimony." The metal does not rust or tarnish except slightly in air, but if exposed while in a state of fusion it quickly oxidises.

It dissolves in strong hydrochloric acid and in concentrated sulphuric acid. Nitric acid, even if very dilute, also dissolves it.

The extraction of the metal from its principal ores is simple, but usually involves several processes. Crude metal may be obtained in the first instance by a process of liquation, and the product refined in one of several ways into "regulus," which is the standard antimony of commerce. The old English method of obtaining the metal direct from stibnite consisted in smelting the ore with an alkaline flux (salt cake) and scrap iron in crucibles. When molten, the contents of the crucible were run into conical moulds which gave when cool an impure antimony, a regulus, and a slag of sulphide of iron. The process is still in use. The regulus so obtained, as also regulus prepared in other ways, is refined by heating in crucibles with soda, common salt, and a certain amount of pure antimonial ore. The iron, which is usually the chief impurity, and other foreign metals present are oxidised and scorified, the



resulting product being nearly pure antimony, containing 99.6 of the metal and known as "star" antimony from the fact that the surface of the ingots or slabs when cool are beautifully figured with stars.

The methods of extraction used in France, formerly the chief producer of antimony, and also where the ores contain appreciable quantities of arsenic, are more elaborate, and various furnaces are used.

The principal uses of antimony in the arts are in the preparation of alloys, particularly Britannia metal, type metal, pewter, and anti-friction metals. Its peculiar value in the making of type metal lies in the hardness which it imparts and the fact that it expands slightly on cooling and thus makes a very sharp and clearly defined cast. Its value for domestic articles lies in its hardness and its resistance to corrosion or tarnishing. Alloys, *e.g.* hard lead, are used in lead pipes, in the manufacture of shrapnel and shot, for battery plates, siphon taps, cable covering, and toys.

Antimony is widely distributed in nature, ores occurring in about 16 countries. China is the world's largest supplier, producing 17,000 tons in 1936. Other production figures for that year (in tons) were: U.S.A., 9,000; Mexico, 7,000; Bolivia, 6,000; Yugoslavia, 2,000; Czechoslovakia, 1,000; Algeria, 1,000; Peru, 1,000.

**Antimony Compounds.** Three oxides of antimony, the trioxide ( $\text{Sb}_2\text{O}_3$ ), the tetroxide ( $\text{Sb}_2\text{O}_4$ ), and the pentoxide ( $\text{Sb}_2\text{O}_5$ ), are known. Antimony trioxide is found native, but is usually prepared by boiling powdered antimony sulphide with hydrochloric and nitric acids until free from sulphuretted hydrogen, pouring the liquid into a large volume of water, and washing the precipitate until it is free from acid. From it is prepared tartar emetic, used in medicine and as a mordant in dyeing and calico printing. The two chlorides of antimony are the trichloride ( $\text{SbCl}_3$ ) and the pentachloride ( $\text{SbCl}_5$ ).

Antimony trichloride is prepared by dissolving the sulphide in strong hydrochloric acid and evaporating the liquid to dryness. The pasty mass obtained is known as butter of antimony, a name first applied to it by Basil Valentine. In concentrated solution, butter of antimony is used in veterinary medicine as a caustic, and also for browning rifle barrels. When this solution of antimony trichloride is poured into water, a white precipitate of basic chloride is obtained, which as Powder of Algaroth was much employed in medicine towards the

end of the 16th century by a Veronese physician named Algarothus. Of the two sulphides of antimony, antimony trisulphide ( $\text{Sb}_2\text{S}_3$ ) is found in nature as antimony ore, and somewhat resembles graphite in physical properties. As kohl, this native form has been used in the East from time immemorial for colouring the eyebrows and skin. It can also be prepared as a red powder by passing sulphuretted hydrogen into a solution of an antimony salt. This form is for vulcanising rubber, in making fireworks, and as an ingredient in match-head composition.

Kermes mineral or Carthusian powder, formerly of high repute as a febrifuge, is, from its method of preparation, a mixture of antimony trisulphide and trioxide. Antimony cinnabar, used in painting, is an oxisulphide. Schlippe's salt, employed in photography, is made by warming antimony trisulphide with a strong solution of sodium sulphide. Antimony pentasulphide ( $\text{Sb}_2\text{S}_5$ ) or golden sulphide of antimony, made by boiling the trisulphide with sulphur and caustic potash, filtering, and precipitating with an acid, was formerly a favourite medicine. The organic compounds of antimony are of considerable importance in medicine as anthelmintics and in the treatment of tropical diseases. The symptoms of acute and chronic antimony poisoning are similar to those caused by arsenic.

**Antimony Ores.** The chief ore of antimony is stibnite or antimonite, which is a sulphide of the metal. It also occurs in numerous associations with other metals—arsenic, lead, copper, iron, nickel, silver, and zinc. Stibnite is lead grey in colour, builds blade-like crystals, occurs in veins deposited from alkaline solutions, and is usually associated with quartz. It is found in China, Japan, Bohemia, Mexico, Corsica, America, and to a limited extent in Cornwall. The First Great War, by increasing demand and cutting off Continental supplies, stimulated production in other regions, and the metal is now being worked in California, Nevada, Alaska, Mexico, Bolivia, Algeria, France, Italy, Spain, Canada, Germany, Hungary, and the Transvaal.

**Antinomianism** (Gr. *anti*, in place of; *nomos*, law). Term, first employed by Luther against Johannes Agricola, to express the doctrine that Christians being saved by faith alone are bound by no obligation to keep the law of God. An exaggerated view of St. Paul's teaching on justification by faith (Romans), and a reaction

from Judaism, the tendency to antinomianism is found in early Gnostic sects and in later mystics. It was fiercely maintained in Germany in the 16th century, and as fiercely opposed by Luther, and was rife in England at the time of the Commonwealth.

The controversy was concerned with belief only, without reference to conduct, but from time to time, and especially in the case of the Anabaptists, antinomianism was pleaded in extenuation of the grossest excesses, the argument being that since man is saved by his mental attitude, *i.e.* by his acceptance of the atonement of Christ, it is irrelevant what is done by the body. The doctrine was formally condemned by the Council of Trent, by Luther, and by the leading divines of the Church of England and Nonconformity. Its vitality is still seen in numerous societies formed to concentrate on thought and ignore rules of conduct and the external practices of religion. The real antithesis of antinomianism is formalism, which, again ignoring conduct, would practically confine Christianity to the observances of ecclesiastical laws. See Anabaptists.

**Antinomy** (Gr. *anti*, against; *nomos*, law). Kant's term for a system of two contradictory propositions, each to all appearances equally valid. Thus, either of the propositions, "the world has a beginning in time and is limited as to space," "the world has neither beginning nor limits," can be equally defended. See Logic.

**Antinous** (d. A.D. 122). Favourite of the Roman emperor Hadrian. He was born at Claudiopolis, in Bithynia, and drowned himself in the Nile at Besa. To signify his grief and perpetuate his memory, Hadrian enrolled Antinous among



Antinous, favourite of the Roman emperor Hadrian

Vatican, Rome

the gods, built temples and erected statues in his honour, of which a bust in the Vatican and a statue in the Capitoline museum are examples. Antinous also appears on coins and gems, and his name was given to a constellation.

**Antioch** or **ANTAKYA**. Town of Turkey, in the vilayet of Hatay. It is on the left bank of the Orontes, about 60 m. W. of Aleppo. Founded by Seleucus Nicator in 300 B.C. in memory of his father Antiochus, for a time it rivalled Rome in greatness. Called Antioch the Beautiful, it lay in a fertile plain 20 m. from the sea, and at its zenith had a population of 500,000. It played a leading part in the early days of

**Antiochus**. Name borne by thirteen Macedonian kings of Syria of the house of the Seleucidae (*q.v.*). Nearly every king of the dynasty was named either Antiochus or Seleucus.

**Antiope**. In Greek mythology, mother by Zeus of the twins Amphion and Zethus. She afterwards married Lycus, king of Thebes, but he tired of her and took Dirce to wife, the pair heaping both insult and cruelty on Antiope. When her sons reached manhood and learned of the persecution of their mother, they killed Lycus and Dirce.

**Antioquia**. Department of Colombia. It contains branches of the Cordilleras and is watered by the Cauca Magdalena and other

are anti-parallel to  $AB$  and  $AC$  when the angle  $ACB$  equals the angle  $AXY$ . See Geometry.

**Antiparos** or **OLLAROS**. Island in the Aegean Sea, one of the Cyclades. It is near Paros, hence the name, is 8 m. long by about 3 m. broad, and has a famous stalactite cavern.

**Antipater** (d. 319 B.C.). General of Philip of Macedon and of Alexander the Great. When the latter embarked on his Persian campaigns he left Antipater behind as regent in which capacity he put down a Spartan revolt at Megalopolis in 331. After Alexander's death he shared the government of Macedonia with his son-in-law Craterus, but the change inspired the Greeks with the hope of regaining their freedom. For a time Antipater was hard pressed, but eventually he decisively defeated the combined Greek forces at Crannon (322). After the murder of Perdiccas (321), he was declared regent of the empire at Triparadeisus in Syria. He died in Macedonia.

**Antipathy** (Gr. *anti*, against; *pathos*, feeling). The opposite of sympathy, - an instinctive, unreasoning aversion to persons or things, physical or psychological. In the first case it is natural, depending upon the peculiar structure of our senses; in the second it is acquired, in most cases the result of the association of ideas. Certain persons cannot endure the smell of certain flowers; Erasmus became ill if he smelt fish. Many women and even men are alarmed at the sight of a mouse; Lord Roberts had a great aversion to cats. The dog has a natural antipathy to the wolf and the cat, the bull and the turkey to the colour red.

**Antiphrilos**. A Greek painter. Born in Egypt, he flourished about 330 B.C. Crossing to Macedonia, he lived at the capital, Pella, and is said to have painted the portraits of Philip and Alexander the Great. He later returned to Egypt, where he enjoyed the favour of Ptolemy I. He was jealous of his great rival Apelles (*q.v.*), whom he accused of discreditable conduct. Ptolemy, having discovered that the charge was false, is said to have presented Apelles with 100 talents (£20,000) and to have given him Antiphrilos as a slave.

**Antiphon** (480-411 B.C.). One of the ten Attic orators. Born at Rhamnus in Attica, he conducted a school of rhetoric which Thucydides the historian is said to have attended. Of his fifteen extant speeches the majority were composed as models for pupils, the remainder for use by clients



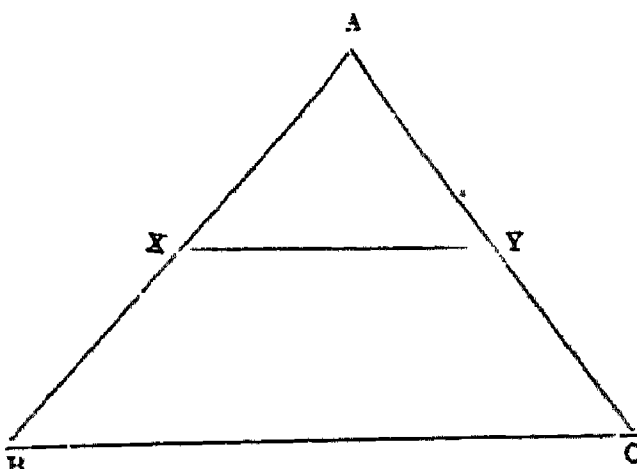
Antioch, Turkey, on the Orontes, about sixty miles west of Aleppo. Known as Antioch the Beautiful, it once rivalled Rome in its greatness

Christianity, and here the followers of Christ were first called Christians (Acts xi, 26). Its bishops were patriarchs of the first rank, and for long it was the centre of missionary enterprise. Captured and destroyed by the Persians in A.D. 538, it was by the Arabs c. 638, from which time its decline dated. It prospered again under the Christians from 1098 to 1268, when it was taken by the Egyptian Bibars and gradually decayed. The modern town is a place of slight importance, trading in grain, silk, tobacco, and cotton. Excavations carried out in Antioch and its suburb Daphne during 1931-39 by a Franco-American expedition unearthed a series of remarkable Roman and Byzantine mosaics. Pop. 28,000.

**Antioch**. Ancient city of Pisidia founded, like Antioch in Turkey, by Seleucus Nicator. It was colonised under Augustus and received the name of Caesarea. S. Paul visited it (Acts 13 and 14). Its site is about 200 m. E. of Izmir.

streams; its area is 25,419 sq. m. To the N. it extends to the Gulf of Darien. The mts. are forest-clad and rich in gold, silver, platinum, iron, coal, galena, and rock salt. Chief products are coffee, rubber, maize, timber, cotton, sugar-cane, and tobacco. The capital is Medellin. Pop. (1951) 1,570,197.

**Anti-parallel**. Term used in geometry. It denotes the figures created when lines cross others in such a way as to produce equal angles in a figure, but on contrary sides to what would have been the case had the crossed lines been



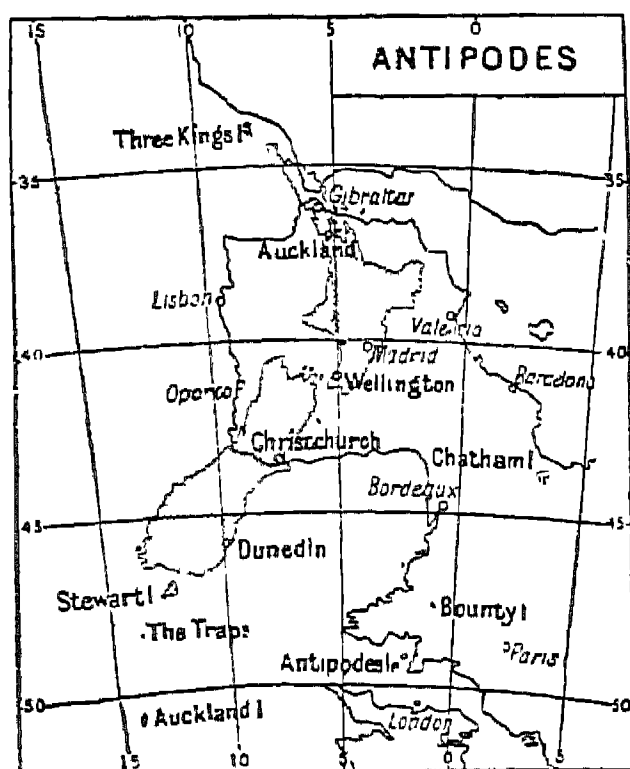
parallel. Thus in the figure  $AXBCY$  the lines  $XY$  and  $BC$



in the law courts. Antiphon enjoyed a great reputation as orator, but his only known public speech is his own defence when arraigned after the fall of The Four Hundred. Despite his eloquence, he was condemned and executed. Consult *Attic Orators*, R. C. Jebb, 1876.

**Antiphonal** (Gr. *anti*, opposite; *phōnē*, voice). Music in which effects of response are used. Officiant and choir, soloists and choir, or a divided choir, may be employed with this object. Antiphonal singing is heard in the chanting of the Psalms in the Roman Catholic and Anglican Churches, where alternate verses or half-verses are allotted to opposite sides of the choir.

**Antipodes** (Gr. *anti*, against; *podes*, feet). Geographical term meaning directly opposite each



Antipodes. Map indicating the antipodal relation of London and W. Europe to New Zealand

other. Points are antipodal to each other when they are at opposite ends of a straight line joining the points and also passing through the centre of the earth. Thus one point is as far N. of the equator as the other is S., while each is separated from the other by 180° of longitude. Although the longitude of New Zealand is roughly that of a land antipodal to the British Isles, the S. of Britain is some 1,100 m. farther from the equator than the N. of New Zealand.

**Antipodes Islands.** Group of uninhabited rocky isles in the S. Pacific. They belong to, and are about 480 m. S.E. of, New Zealand.

**Antipope.** Pope set up in opposition to the canonically elected pontiff. The Roman Catholic Church recognizes an unbroken series of true popes; any opposition clerics for whom the title is claimed are accounted antipopes.

Felix, in the 4th century, is often wrongly called the first anti-

pope. He was intruded during the exile of Liberius, but was canonised as a saint. The last was Felix V, Amadeus of Savoy, who was elected by the Council of Basel in the 15th century, in opposition to Eugenius IV. On the death of Eugenius Nicholas V was elected, and during his pontificate Felix resigned his claim. The Great Schism began in 1378 with the election of the antipope Clement VII in opposition to Urban VI. Clement's successor bore the name of Benedict XIII. In 1409 the Council of Pisa declared the deposition of both Benedict and the opposition pope Gregory XII, but neither would resign, and after a short interval John XXIII was appointed. The contest between the three popes was settled at the Council of Constance, which elected Martin V in 1417.

**Antipyrin.** Antipyretic and analgesic drug introduced into medicine in 1884. A white crystalline powder, chemically a phenylpyrazolone derivative, it is also known as phenazone.

**Antiquaries OF LONDON, SOCIETY OF.** English learned society, founded in 1707, granted a royal charter in 1751. It ranks in age and dignity next to the Royal Society, and its president is an official trustee of the British Museum. The offices are at Burlington House, London, W. Its library, containing some 150,000 British and foreign books and periodicals dealing with antiquarian and archaeological studies, is available for fellows (F.S.A.). Its publications are *Archaeologia*, since 1770; and *The Antiquaries Journal*.

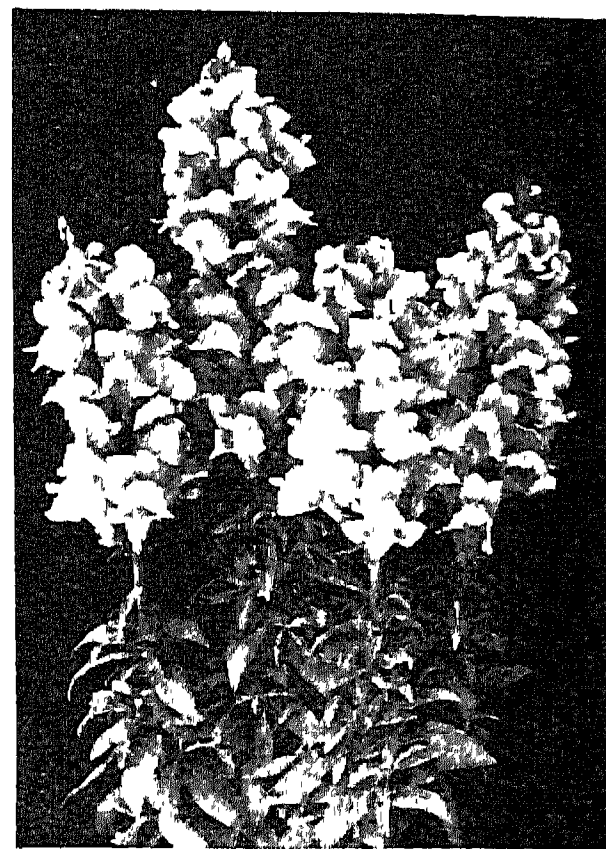
**Antiquaries, SOCIETY OF.** A Scottish learned society, founded in Edinburgh in 1780. The fellows at once began the formation of a museum, primarily to illustrate Scottish history. In 1856 this was presented to the public, and has been since maintained as the National Museum of Antiquities of Scotland. The fellows are described as F.S.A.Scot.

**Antiquary, THE.** Third of the Waverley Novels and Scott's own favourite. It was published in May, 1816. "There is assuredly," writes Lockhart, "no one of all Scott's works on which more of his own early associations have left their image." The book gives a picture of life in Forfarshire (Angus) in the last decade of the 18th century, and is notable for some of the most effective of Scott's creations—Jonathan Oldbuck, the bachelor antiquary; Edie Ochiltree, the garrulous but shrewd old gaberlunzie man; the

gloomy Glenallans, the tragic Mucklebackits, and others.

**Antique.** Term used for a piece of furniture or an object of art of which the chief value and interest lie in its age. The term has no strict meaning, but it is of practical interest to those who may wish to import old things from one country to another. Under British customs regulations, duty is not charged on goods (wines and spirits excepted) made more than one hundred years before importation. Under U.S. customs regulations, objects made before 1830 are not liable to customs duty on importation into the U.S.A.

**Antirrhinum** OR SNAPDRAGON. *Antirrhinum majus* is a perennial herb of the family Scrophulariaceae, a native of Europe. The variable leaves are more or less lance-shaped. The tubular flowers are purplish-red and closed by the compression of the rounded upper lip. Garden antirrhinums are cultivated forms, and white, yellow, crimson, or variegated



Antirrhinum. Fine blooms of the variety known as Royal Rose

in colour. The only native British species, *A. orontium*, is found mainly in cornfields.

**Antisana.** Active volcano of the Andes in Ecuador. It is 35 m. S.E. of Quito, and is 19,000 ft. high. On its slopes is one of the highest inhabited villages in the world, Tambo de Antisana, 12,400 ft. above sea level.

**Anti-Semitism.** Modern term for that open hostility to the Jews which has existed in varying degree in every country where they have been found since the 4th century A.D. The word Semite is commonly regarded in Europe as equivalent to Jew, the only Semitic

people who have found a permanent home in Europe being the Jews. While the question of religion had some relation to the hostility to the Jew in the earlier Middle Ages, the basis of anti-semitism has been in the main economic and social; in its modern form it is political, economic, and, most of all, racial.

The argument of the anti-semite is that the Jew, being always of alien race, cannot be absorbed into national life; and that, since he naturally puts the welfare of his own race before that of the country of his adoption, he should be excluded from all share in the government of that country. The answer of the Jew to this contention is that he has always proved himself a loyal, law-abiding, and industrious citizen in whatever land he has settled, and that the international character of his community does not conflict with national duty. Anti-semite outbreaks in Eastern Europe were largely the result of the indebtedness of the people to the Jewish moneylenders, the latter having acquired a hold on the land of the peasants as security for loans.

As an organized political movement anti-semitism dates from the latter half of the 19th century. In Germany, France, Austria, and Holland it was directed to excluding the Jew from political rights. In Russia, Rumania, and Poland it was displayed in violent attacks upon his person and property. In 1873, during a time of German financial crisis, a Hamburg journalist, Wilhelm Marr, published a pamphlet called *The Victory of Judaism Over Germanism*, which became the basis of an organized anti-semitic movement, attracting a considerable strength of clerical and conservative support. It died down some years later after certain scandals in which the leaders were involved. Many potential supporters were also horrified by events in Russia, where extensive savage pogroms took place in 1881, hundreds of Jews being robbed and murdered. Almost simultaneously anti-

semitic outbreaks occurred in Austria and Hungary. In France the movement reached its height in the trial and conviction of Alfred Dreyfus (*q.v.*).

After the Russian revolution of 1917 many people professed to see in the new Bolshevik government a Jewish conspiracy to overthrow Christian civilization. The work, *Protocols of the Leaders of Zion*, purported to be the minutes of a



Anti-semitism. Jewish husband and wife wearing the yellow Star of Judah which was enforced in Germany in the Second Great War

secret conference of leading Jews at which a plan of world domination was drawn up. This was exposed as a forgery in 1921, but Nazi Germans later accepted its authenticity as justification for their own crimes.

Anti-semitism had returned to Europe with renewed violence on the rise of Hitler to power in 1933. Hitler was a lifelong Jew-hater, suspecting and fearing Jewish influence everywhere. Under his regime Jews in Germany, of every walk of life, were penalised as a non-Aryan race by the so-called Nuremberg laws. They were deprived of the protection of the law; their means of livelihood were removed; their property was confiscated; they were sent to concentration camps, hunted into exile, or murdered. In Streicher's paper, *Der Stürmer*, they were constantly assailed with brutal indecency. Hitler admitted many times that he aimed at the physical extermination of the Jewish race.

The Second Great War gave him every chance for further repressive measures. Jews in Germany were denied ration cards; they were excluded from all means of public transport and centres of public recreation. They were obliged to wear a yellow badge as a mark of recognition. Jews were forcibly

removed from central and western Europe to eastern Europe, where they were crowded into ghettos. The same measures were applied in countries in Nazi occupation or under Nazi influence. In Poland, particularly, Jews were massacred wholesale. In April, 1943, about 40,000 Jews in the Warsaw ghetto resisted a German attack. Thousands were killed and the survivors were deported to an unknown fate. Hundreds of thousands of Jews were exported as slaves from France with the tacit consent of Pétain and Laval.

It has been computed that upward of 5,000,000 Jews were exterminated by the Nazis, in crematoriums and asphyxiation halls, by machine-gunning, clubbing, and mass drownings. At Maidanek, in Poland, 18,000 were killed in a single day, Nov. 3, 1943, to the music of brass bands.

Equality for all citizens was written into the constitution of the U.S.S.R. and those of the countries of eastern Europe that came under Russian domination after the Second Great War; but this did not prevent anti-semitic feeling and an occasional outbreak (sometimes apparently government inspired) of persecution of the Jews, despite their greatly reduced numbers, in Communist eastern Europe.

Neither in Great Britain nor in the U.S.A. (which has by far the largest Jewish population of any country in the world) has anti-semitism obtained any considerable influence, though the British fascists led by Sir Oswald Mosley in the years immediately before the Second Great War made attacks on Jews in the poorer parts of London and other cities.

**Antiseptics** (Gr. *anti*, against; *septikos*, putrefying). Substances which destroy bacteria or arrest their growth. Pasteur proved that putrefaction and fermentation are always due to bacteria or related micro-organisms, as are also those diseases termed infectious. When antiseptic agencies actually kill the bacteria, sterilisation or bactericidal action is said to occur. Antiseptic properties are exhibited in a variety of ways, *e.g.* the inhibitory effect exerted on many bacteria by the fluid constituents of the blood, to which in part must be ascribed the resistance to infection manifested by the living body. Many chemicals such as strong acids or alkalis, *e.g.* quicklime, kill bacteria; and concentrated salt solution has the property of



preventing bacterial growth, hence its use in pickling meat, etc. The term antiseptic, however, is usually restricted to definite chemical compounds which act in high dilutions. Among physical agencies heat and certain radiations are very effective, *e.g.* light rays, especially in the ultra-violet region of the spectrum. Antiseptics produce physical or chemical changes in the organisms which are incompatible with their life-processes, but the exact mechanism of these effects is still obscure. To obtain efficient action the antiseptic must have access to the bacteria in a watery medium: thus organisms encased in oily matter are protected, unless the antiseptic can form emulsions with fats, hence the value of detergent preparations. Also, the antiseptic must be used in adequate concentration and must remain in contact with the bacteria for a sufficient time. Again, organic matter if present must be allowed for; since it combines with most antiseptics, a greater amount of the latter will be required.

#### Relative Lethal Properties

Antiseptics differ widely in their potency as measured by the dilution in which they are effective, and also as regards the rate at which they kill bacteria. Thus carbolic acid, Lister's original antiseptic, is comparatively weak, and it is necessary to use  $2\frac{1}{2}$  or 5 p.c. solutions; mercuric chloride under similar conditions is employed in a strength of 1 in 1,000 or 1 in 2,000. These substances kill organisms rapidly, whereas some extremely powerful antiseptics, *e.g.* proflavine and other aminoacridines, act relatively slowly, *i.e.* are at first only inhibitory (bacteriostatic) and finally lethal. All organisms are not equally susceptible to a given antiseptic. Solutions of hypochlorites (bleaching powder) are exceedingly rapid, powerful bactericides when other organic matter is absent, hence their use for rendering supplies of drinking water safe.

It is of practical importance that heat, particularly when moist, is highly destructive, momentary exposure to boiling water killing the majority of bacteria, *e.g.* tubercle bacilli. When sterilising a fluid, however, care must be taken that the whole material actually reaches the lethal temperature. When dry, many organisms will withstand brief exposure to temperatures over  $100^{\circ}\text{C.}$ ; on the other hand, in the

absence of moisture bacterial multiplication is inhibited, and some bacteria are killed by ordinary conditions of drying. The process of pasteurising depends on the fact that exposure of aqueous fluids, *e.g.* milk, to lower temperatures— $162^{\circ}\text{F.}$  for at least 15 seconds or  $145^{\circ}\text{F.}$  for 30 minutes—kills any pathogenic bacteria which may be present and also greatly increases keeping properties by destroying most of the organisms which cause souring and putrefaction. Beer and light wines can be treated similarly. The process of "canning" of foodstuffs depends on sterilisation at higher temperatures, with exclusion of air from the containers. Certain species of bacteria can produce resistant forms, known as spores, which require prolonged boiling for their destruction, *e.g.* at least 5 to 10 minutes for the spores of anthrax, tetanus, and gas gangrene bacilli, or many hours in the case of certain others, such as the hay bacillus. Spores are also resistant to chemical antiseptics; but are killed rapidly by moist steam under pressure, *e.g.* in less than 30 minutes at  $115^{\circ}\text{C.}$  Temperatures at or below  $32^{\circ}\text{F.}$  inhibit the multiplication of bacteria, hence the method of preserving meat and other food by chilling; but cold is not lethal, organisms being found to survive exposure even to liquid hydrogen.

#### Varieties and Specific Uses

The general employment of antiseptics in surgery dates from the discovery by Lord Lister that Pasteur's work on putrefaction applies also to sepsis in wounds, *i.e.* a wound will heal without the occurrence of suppuration provided that it is not contaminated with virulent bacteria. By ensuring that the patient's skin is properly cleansed and that everything which comes into contact with the site of operation has been sterilised, a surgical wound will usually heal aseptically. Virulent organisms may be conveyed by the air in contaminated dust, but this is not usually an important source of wound infections. The applicability of different antiseptics depends on the particular purpose for which they are to be employed. For sterilising surgical dressings, and infected materials, moist steam, phenolic compounds, mercuric chloride, or hypochlorites are widely used, and for surgical cat-gut watery solution of iodine or hydrogen peroxide. For application to the skin

alcohol (70 p.c. of absolute) and alcoholic solutions of certain organic dyes (brilliant green, crystal violet, and aminoacridines) are suitable. For disinfection of the air in rooms, wards, etc., the following are recommended—ultra-violet radiation, propylene glycol as vapour, or a fine spray (aerosol) of hypochlorite solution.

#### Science of Chemotherapy

An entirely different problem is the attempt to destroy micro-organisms in an infected body without damaging the living tissues in which they are embedded. This branch of treatment is called chemotherapy. It presents greater difficulties than that of sterilising dead materials. Most antiseptics are comparatively ineffective or actually harmful in the living body, because they combine with the tissues and body-fluids, and so are neutralised before reaching the organisms and also because they are active tissue-poisons, like phenol or mercuric chloride. Thus for introduction into infected wounds where a local action on bacteria is desired, *i.e.* surface antiseptic effect, useful substances are those which are relatively non-poisonous, and which are not inactivated by blood serum, *e.g.* the aminoacridines (proflavine, monacrine, etc.), sulphonamides, and penicillin, or a mixture of these. Neutral hypochlorite solutions (eusol, Dakin's solution) and the chloramines have the property of becoming transformed into harmless compounds in the tissues, so that they can safely be frequently renewed. It is still more difficult to act on bacteria in the blood stream or to reach infected sites in the tissues by systematic administration of drugs. When administered in this way the sulphonamides and antibiotics are effective against many pathogenic bacteria including those usually responsible for septic infections. In the case of chemotherapeutic agents it is probable that the destruction of the micro-organisms in the body is usually due to the cooperated action of the drug with the defensive mechanisms of the living tissues.

C. H. Browning, M.D., F.R.S.

*Bibliography.* Disinfection and Disinfectants, S. Rideal, 2nd ed., 1898; Handbook on Antiseptics, H. D. Dakin and E. K. Dunham, 1917; The Extra Pharmacopoeia, W. Martindale, 22nd ed., 1941-43.

**Anti-Slavery Movement.** Agitation and organization to abolish slavery. It was conducted in two distinct stages—(1) the stopping

of the slave trade, and (2) the abolition of slavery itself.

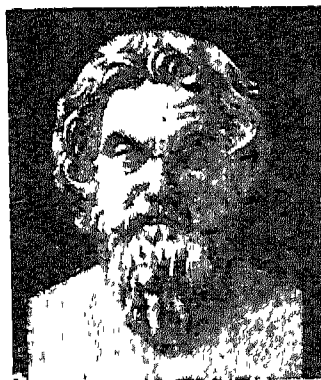
In 1772 a legal decision was given that a slave could not be owned while in the U.K. An act stopping the British slave trade was passed March 25, 1807, and the imposition of heavy penalties on offenders in 1811 finally suppressed it. Denmark had abolished the trade in 1792. The U.S.A. in 1794 prohibited trade in slaves with foreign countries, and in 1807 stopped all importation of slaves. The attack on the trade had been led in the U.K. by Thomas Clarkson, William Wilberforce, and Zachary Macaulay. The Emancipation Act, passed by the British parliament Aug. 7, 1833, was a measure that came gradually into operation so as to release all slaves in the British Empire by 1840. The end arrived two years earlier through the voluntary release of the slaves, who had proved intractable during the transition period.

Slavery was extinguished in the French colonies in 1848, by the Netherlands in 1863. In the U.S.A. it was ended by the 13th Amendment, 1865. The northern states of the Union had emancipated their slaves, for whose services there was no demand, during the period of the English agitation before 1840, but many were sold into the southern states, where the cotton industry required cheap labour. Seeing their economic prosperity threatened by the anti-slavery movement, the southern states claimed the right to secede, and the Civil War followed. See American Civil War; Slavery; Slave Trade; consult also History of the Abolition of the African Slave Trade, T. Clarkson, 1808; History of Slavery and Serfdom, J. K. Ingram, 1895.

**Anti-Slavery Society.** Society founded in 1823 to combat slavery in the British Empire. That object achieved (*v.s.*), in 1839 it became the British and Foreign Anti-Slavery Society to work for the extinction of slavery everywhere, and to protect British freed slaves. It watched native conditions in the British colonies; strove to improve those in lands for which Great Britain had treaty obligations, such as the Belgian Congo, and also in colonial areas under other administration where British capital was invested (*e.g.* Putumayo). It cooperated with societies in other civilized lands which had similar objects. It had a parliamentary committee and published a quarterly journal,

The Anti-Slavery Reporter and Aborigines' Friend. In 1909 the society was amalgamated with the Aborigines Protection Society under the name of the Anti-Slavery and Aborigines Protection Society. The offices are at 49, Denison House, Vauxhall Bridge Road, London, S.W.1.

**Antisthenes** (c. 444–365 B.C.). Founder of the Cynic school of



Antisthenes,  
Greek philosopher

Greek philosophy. Born at Athens, originally a pupil of the rhetorician Gorgias, he became a follower of Socrates, after whose death, 399, he founded a school in the Cynosarges gymnasium. He chiefly devoted himself to the ethical side of his master's teaching, and held that virtue consisted in doing without all but the barest necessities of life and in the avoidance of evil; that the man who wanted little was most like the gods who wanted nothing. He conscientiously practised what he preached, but the doctrines and manner of life of the extremists among his followers degenerated into absurdity. He was the teacher of Diogenes.

**Antistrophe** (Gr. *antistrophein*, to turn to the opposite side). In Greek chorus and dance, that part of an ode which was sung as the chorus returned from left to right after singing the strophe as they moved from right to left. It is also the stanza of a choral song which alternates with the strophe; and, in rhetoric, the figure of retortion, or turning back of a sentence to a word or idea previously employed in it. *Pron.* an-ti'-stro-fee.

**Anti-Tank Weapons.** See under Tank.

**Anti-Taurus.** A mt. range in Asia Minor, the exact nature and extent of which are doubtful. It is generally regarded as being the range which begins near Mt. Argaeus, 12,565 ft., and extends for over 200 m. in a N.E. direction.

**Antithesis** (Gr. *anti*, against; *thesis*, placing). In rhetoric, a sharp contrast or opposition between sentence and sentence, or sentiment and sentiment. It is used much in the forming of maxims or moral sayings, as in Seneca's "If you regulate your desires according to the standard of nature, you will never be poor; if according to the standard of

opinion, you will never be rich." Macaulay's writings are full of antitheses, *e.g.*: "He had covertly shot at Cromwell, he now openly aimed at the Queen."

In the dialectical philosophies of Hegel and Marx, the antithesis is the second negative moment of the triad, opposed to the thesis, the first positive moment, both being resolved in the third moment, the synthesis.

**Antitoxin** (Gr. *anti*, against; *toxikon*, poison for smearing arrows). Substance which can neutralise the action of a bacterial poison or toxin. It consists of the serum obtained from the blood of a living animal which has been rendered immune from the disease to be cured, or prevented, by injections of the toxin of that disease. Antitoxin has been used successfully in the treatment or prevention of diphtheria, lockjaw, scarlet fever, typhoid fever, etc. In botany the term is used of a secretion in plants which secures them from injury by microbes.

**Anti-Trade Winds.** Winds which blow in the higher levels of the troposphere above the Trade Winds (*q.v.*) and approximately in the reverse direction. They are usually at a height of 6,000 ft. or more, their height varying with latitude and with the season of the year. They are not regularly developed and may have their origin in the flowing away polewards in the upper levels of the rising air of the doldrums region, *i.e.* they may be the return currents carrying the air of the trade winds back to the higher latitudes.

The presence of south-westerly winds at a height above the Atlantic was deduced by von Humboldt in 1798 and by Leopold von Buch in 1815 from the direction of travel of the clouds, and from the direction of prevailing winds observed on the Peak of Tenerife.

The older view was that these winds fell to lower levels as they proceeded polewards, and reached the surface of the sea in the region of the prevailing westerlies (*q.v.*). In the days of sailing ships these westerlies themselves were often called the anti-trade winds, since they provided assistance for crossing the ocean from west to east as the trade winds did from east to west. With more information about temperature distribution at different levels and in different latitudes, the theory which connected the high-level anti-trade winds with the surface westerlies has been discarded.



**Anti-Trust Laws.** U.S. enactments aimed at breaking up, and preventing the formation of, monopoly groups. Kansas passed a state anti-trust law in 1889; 15 other states followed suit; and in 1890 Congress passed an act introduced by John Sherman (1823-1900), senator for Ohio, which declared illegal "every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states, or with foreign nations."

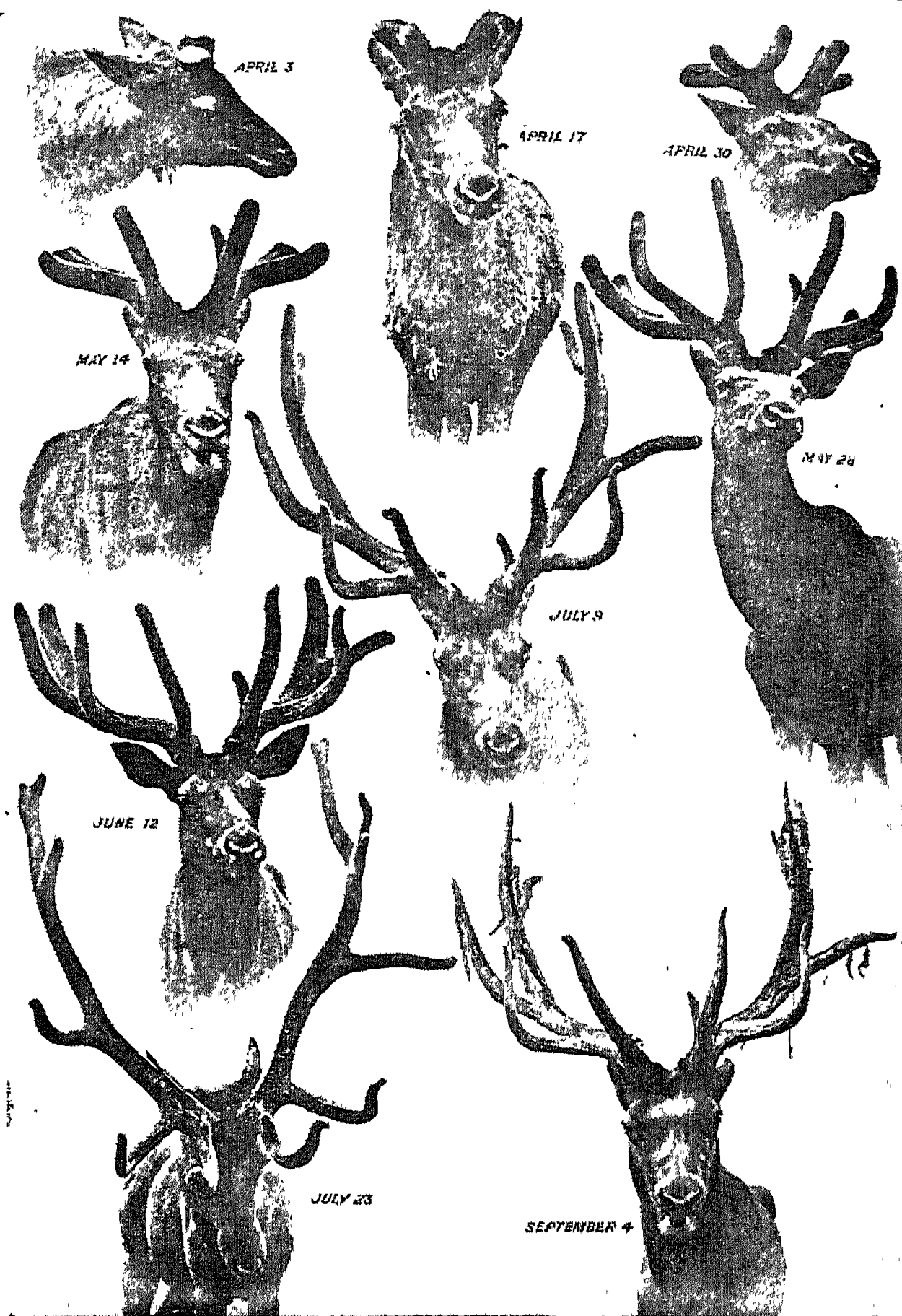
President Theodore Roosevelt made the first serious attempt to enforce this law: 44 actions were started during his term. Under his successor Taft 90 actions were begun: the chief were those which in 1911 compelled Standard Oil of New Jersey and the American Tobacco co. to disintegrate.

The Clayton Anti-Trust Act, 1914, strengthened the Sherman Act, and clarified it, in particular by placing trade unions definitely outside the anti-trust laws.

**Antium.** One of the oldest cities and ports of Latium, the modern Anzio. It stood 33 m. S.E. of Rome, and was a stronghold of the Volscians and the haunt of pirates. Conquered by Rome, 468 B.C., it revolted, and was finally subdued in 341. Antium became a favourite Roman watering-place, and numerous remains of villas and art treasures have been found, e.g. the Apollo Belvedere.

**Anti-Vaccination Movement.** Agitation to bring about the repeal or the modification of the Vaccination Acts; in other words, to abolish compulsory vaccination. In England Acts passed in 1851, 1867, and 1871 made vaccination compulsory, while Scotland and Ireland were similarly treated. This legislation gave birth to the movement, which, after 1867, and especially in Leicester and other Midland towns, attained large proportions, many parents being prosecuted for failing to comply.

In 1898 an Act relieved parents who declared they had a conscientious objection to vaccination from the necessity of having their children vaccinated. A declaration of belief in the injuriousness of vaccination was substituted in 1907. In 1910 the board of education ceased to enforce their previous vaccination requirements on teachers and trainees. From 1923 post-office employees were no longer subject to obligatory vaccination. The National Health Act, 1946, abolished compulsory vaccination. The National Anti-



Antler. Stages of development in the antlers of a full-grown male wapiti, from the beginning (immediately after the shedding of the old antlers) to the completion of the new growth five months later

Photos, H. Irving

Vaccination League, however, continued its propaganda in the U.K. Its offices are at 25, Denison House, Vauxhall Bridge Road, London, S.W. In most other countries there is strong opposition to vaccination, especially in Canada, Australia, and the U.S.A. See Vaccination.

**Antivari.** Italian name of a town and harbour of Yugoslavia, described under its Yugoslav name, Bar.

**Antivenins.** Antitoxins prepared from the blood of animals immunised against snake bite and used to neutralise the effect of the venom in persons bitten by snakes. Scorpion antivenin is also available. See Snake Bite.

**Anti-Vivisection Movement.** Agitation which aims at the abolition of the practice of vivisection. It began about 1876, when the Act still regulating the practice in the United Kingdom was passed

and the National Anti-Vivisection Society was founded by Lord Shaftesbury, Lord Coleridge, and others. The central argument of its supporters is that vivisection involves torture, and as such should not be permitted in any civilized country. The society's work is to watch the operation of the Act of 1876 and to inform public opinion on the subject. It presented its case to the Royal Commission on Vivisection, 1906-8, and has attempted unsuccessfully to pass through Parliament a bill making the use of anaesthetics and stricter regulations obligatory in experiments. Its offices are at 26-28, Warwick Way, London, S.W. See Vivisection.

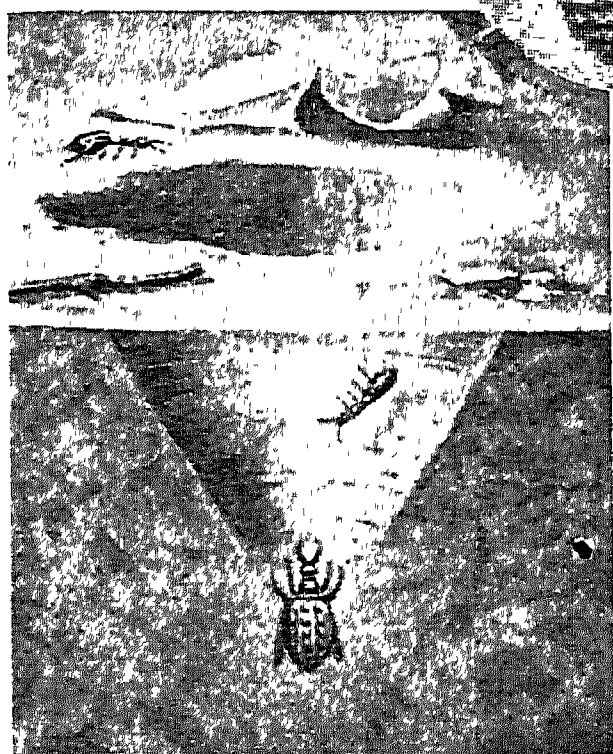
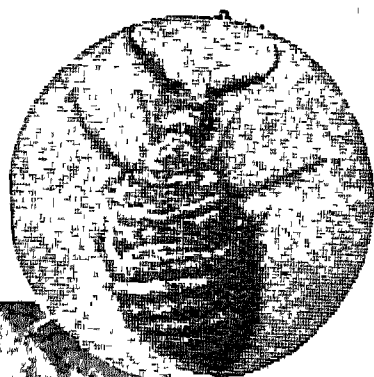
**Antler** (Lat. *ante*, before; *oculus*, eye). Outgrowth from the frontal bone of the deer, usually in the male sex only. Antlers are shed and renewed annually. They spring



from a stalk or pedicle on the skull, the point of junction forming a bony ring or burr. During the period of growth, usually from April to Aug. in British deer, the antlers are covered with hairy skin called the velvet, which is well supplied with blood vessels and hot to the touch. When the antlers are fully developed, the supply of blood is cut off. The skin then dries up and is rubbed off against the branches of trees. As the deer reaches maturity the number of tines or branches on the antlers commonly increases and indicates the approximate age of the animal. Antlers are used by the males for offensive purposes during the breeding season, when furious fights take place. When the antlers are shed the stags become inoffensive.

#### Antlia Pneumatica.

One of the southern circumpolar constellations named by Lacaille. Its name, meaning The Air Pump, is entirely inappropriate.

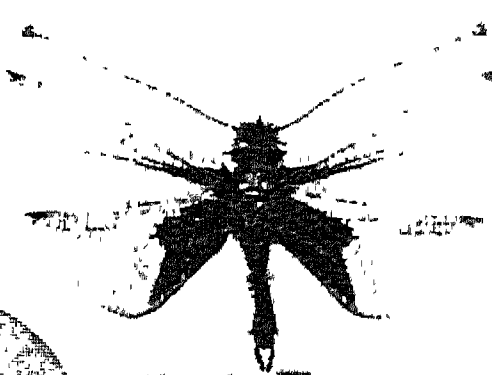


Ant-Lion snaring its prey. In circle, antlion in its larval stage : and, above, the perfect insect of a species which hunts instead of trapping its prey

**Ant-Lion (*Myrmeleon*).** Larval form of a neuropterous insect, common to temperate and tropical regions, so called from its habit of ambushing its prey. After making a conical pit in the loose sand, it buries itself at the bottom with only its head showing. When some passing insect, such as an



Antlers. Annual development of the antlers of the male fallow deer, from the unbranched horn of its second year to the many-tined one of its tenth. Above : Similar development of the antlers of the red deer



ant, slips over the edge of the pit, the antlion throws sand at it to hasten its fall, and then seizes it. After sucking the juices of its prey, the antlion hurls the body out of the pit. The antlion passes through its pupal stage in the sand beneath its pit, which is about 2 ins. deep and 3 ins. wide at the top, and the perfect insect resembles a dragon-fly.

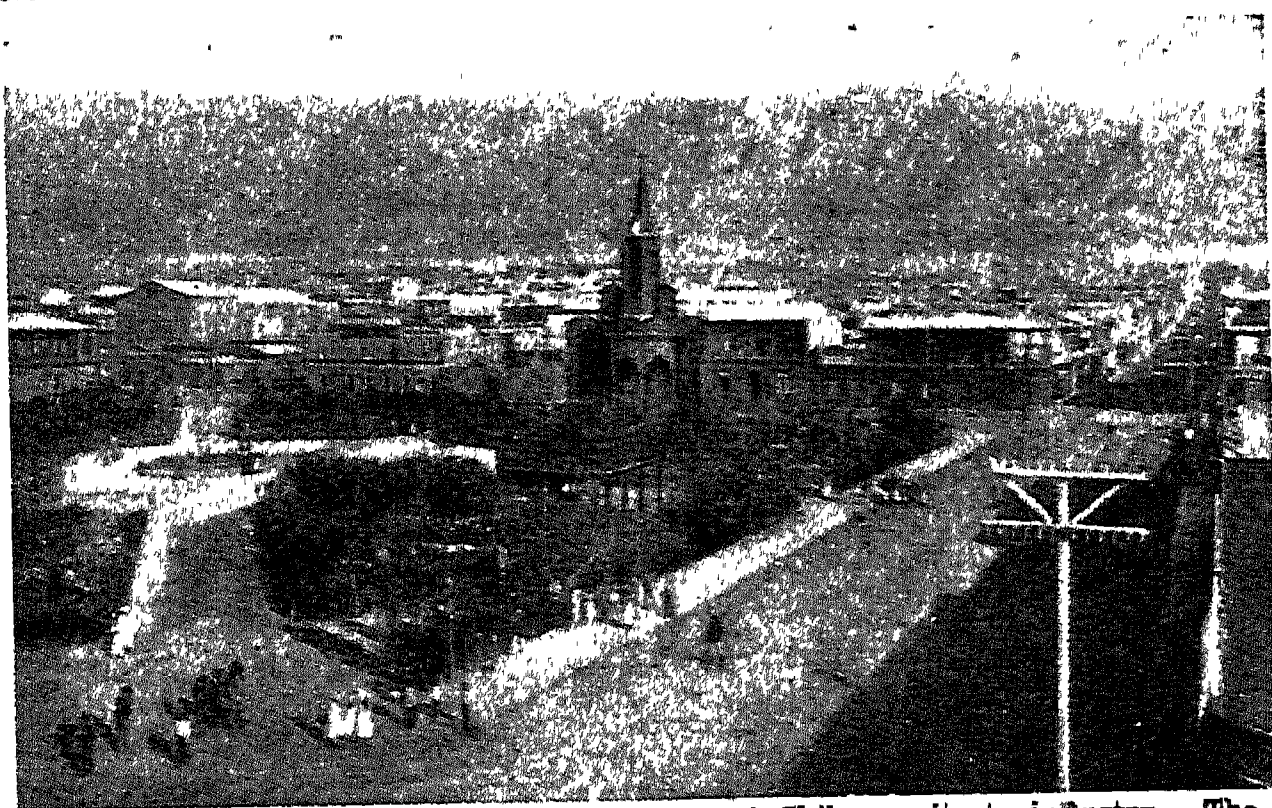
**Antofagasta.** Largest prov. of Chile. It has an area of 47,502

sq. m. It is rich in nitrates, silver, copper, and other minerals. The desert of Atacama covers it, but some grain and fruit are grown on its oases, where also sheep are raised. Llamas, alpacas, and vicuñas are pastured on the Andean slopes. The region was ceded to Chile by Bolivia after the war of 1879-83 (see under Chile). Iodine, borax, and high explosives

are manufactured in the province. Pop. (1952) 184,779.

**Antofagasta.** Seaport of Chile, capital of Antofagasta prov. It is connected by rly. with Oruro and La Paz, in Bolivia, with Salta, in Argentina. Much of the trade of Bolivia passes through this port, whose prosperity is bound up with the market for nitrates and copper. Ships in the roadstead are protected by a breakwater. Pop. (est.) 100,000.

**Antommarchi, FRANCESCO** (c. 1780-1838). Corsican physician, Napoleon's last medical attendant. Antommarchi, who was born in Corsica, spent the years 1818-21 on St. Helena with the exiled emperor who bequeathed him 100,000 frs. His memoirs, *Les Derniers Moments de Napoléon*, were published in Paris in 1823.

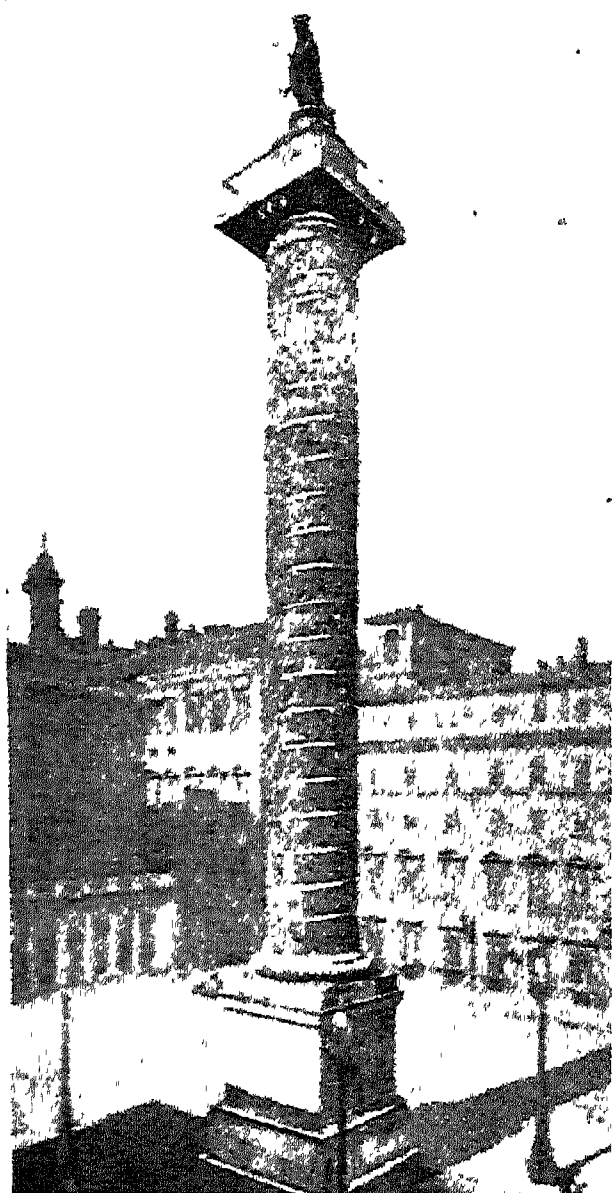


Antofagasta, commercial centre of the great Chilean nitrate industry. The Plaza Colon is on the left, and the Calle Prat on the right



Director of military hospitals in Warsaw during the Polish rebellion, he died in Cuba, April 3, 1838.

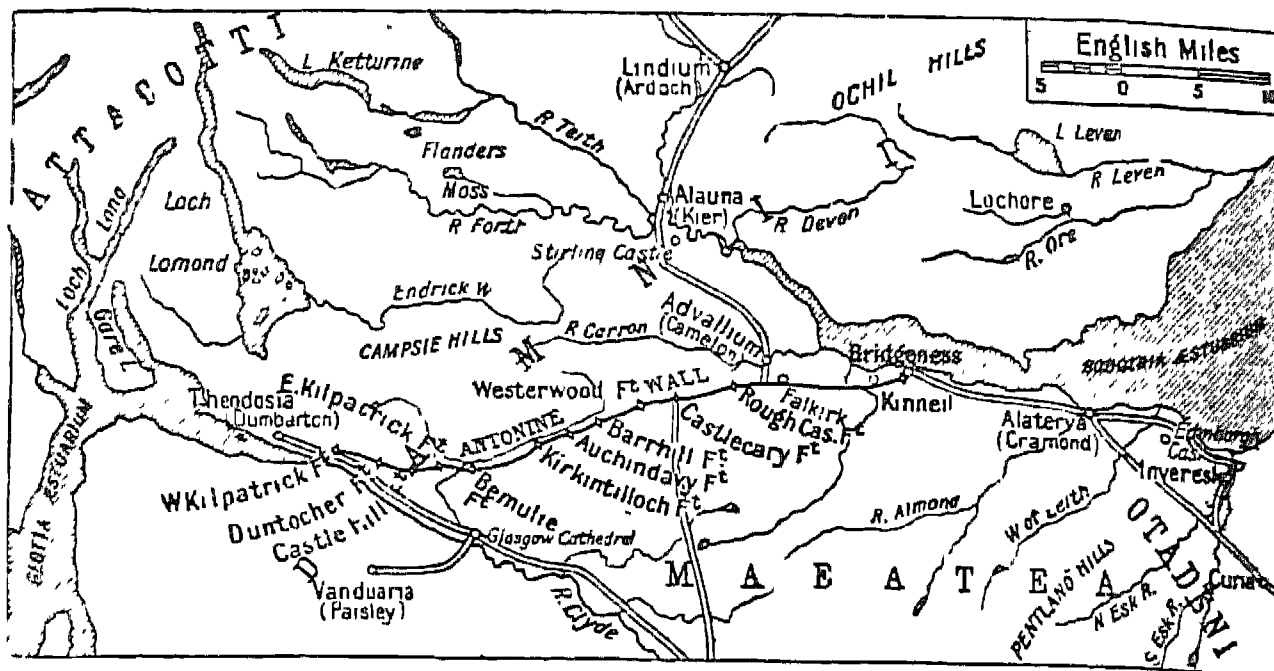
**Antonescu, Ion** (1882-1946). Rumanian dictator. Born in Transylvania, June 2, 1882, he saw service with the Rumanian army in the First Great War, becoming later chief of the general staff and war minister. Imprisoned in 1940 for opposing the cession of Bessarabia to the Russians, he was released by King Carol and appointed prime minister. His first act was to force Carol to abdicate. He then assumed dictatorial powers, and in Nov. signed Rumania's adhesion to the Axis. On his orders the Rumanian army in 1941 joined the Nazis in the invasion of Russia. On Aug. 23, 1944, following Rumania's defeat, he was arrested by order of King Michael. In May, 1946, he was found guilty of war crimes by a Rumanian people's court, and was executed June 1.



**Antonine Column.** Monument in Rome to Marcus Aurelius Antoninus

**Antonine Column.** Name of two monuments set up in Rome. The first, in honour of Antoninus Pius, was a simple monolith of red granite on a pedestal with sculptured sides; only the pedestal, now in the Vatican, remains.

The second, constructed in imitation of Trajan's column, commemorates the victories over the Germans in 172-175 of Marcus Aurelius Antoninus. It has a broad spiral band sculptured with reliefs depicting scenes from the



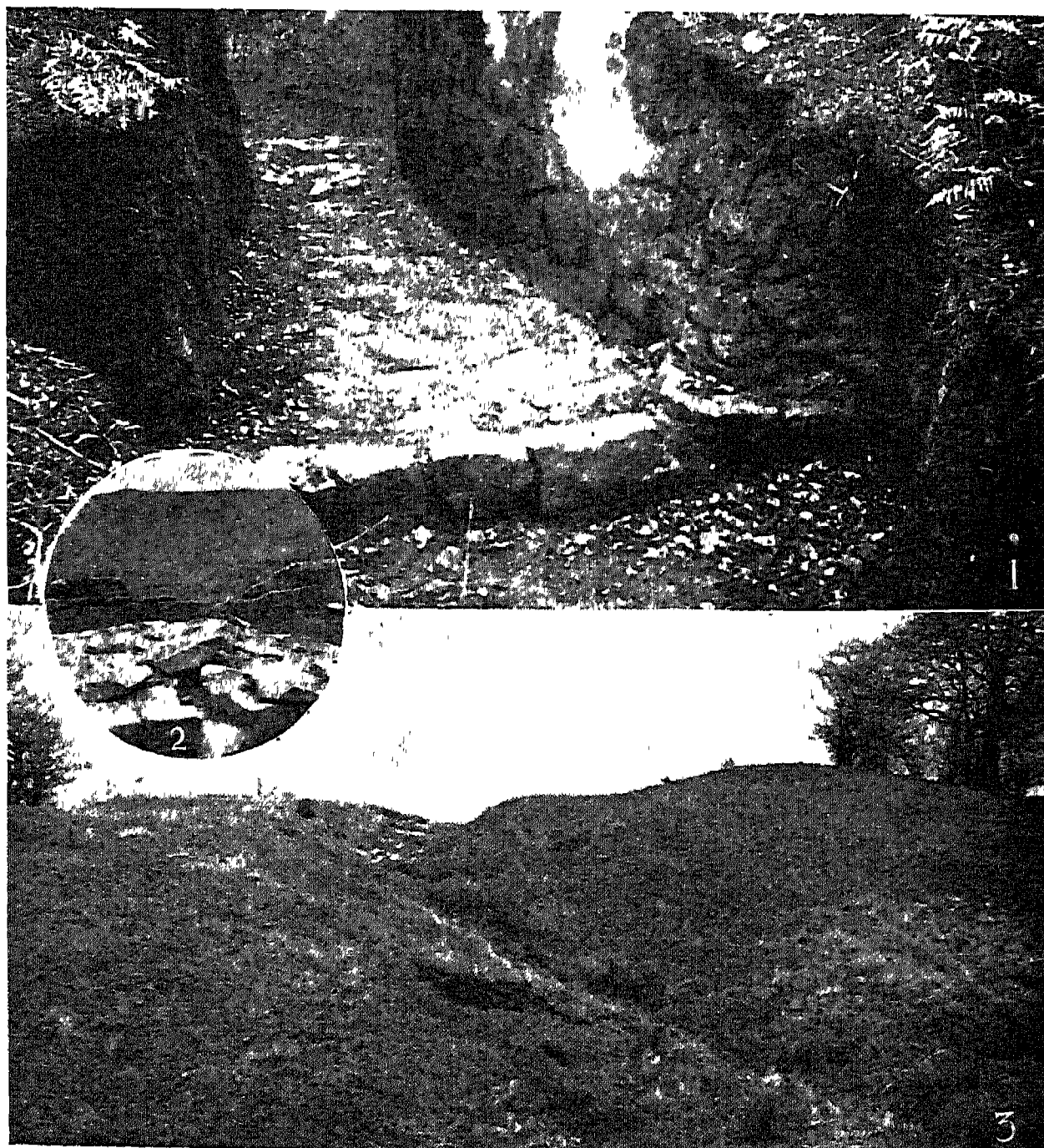
**Antonine Wall.** Map showing the line of this Roman rampart from the Forth to the Clyde, and the positions of some of its forts

emperor's campaigns. It is in the Piazza Colonna, and is surmounted by a figure of S. Paul placed on its summit by Pope Sixtus V in the 16th century.

**Antonines, AGE OF THE.** Period in the history of the Roman empire covered by the rule of the emperors Antoninus Pius (A.D. 138-161) and Marcus Aurelius Antoninus (A.D. 161-180). An era of peace and general prosperity, it came to be regarded as the Golden Age of the empire.

**Antonine Wall.** A Roman rampart, 37 m. long, between the Forth and the Clyde. Erected by

Lollius Urbicus in A.D. 142-143, it became the northernmost outpost of Roman Britain until 185. Mainly of turf, with a ditch in front, it was protected by about 18 forts, some of which, *e.g.* Croy Hill and Bar Hill, mark the site of Agricola's temporary works of about A.D. 80. The stone-ramparted Castlecary is well preserved. A sculptured legionary tablet, dedicated to Antoninus, was found at Bridge-ness and is now in the National Museum, Edinburgh. The wall was known in early Scottish history as Grime's Dyke, later corrupted to Graham's Dyke.



**Antonine Wall, between the Forth and Clyde.** 1. Section through the wall, disclosing the stone foundation. 2. Exposed foundation showing opening for drainage. 3. View of the wall at Fergusson Moor

Photos, Annan

**Antoninus Pius** (A.D. 86-161). Roman emperor, 138-161. Born Sept. 19, 86, he held with credit



Antoninus Pius,  
Roman Emperor  
British Museum

several administrative posts and enjoyed the friendship of Hadrian, who adopted him and designated him his successor. The name Pius refers to his affectionate

regard for the memory of his patron. During the reign of Antoninus the only serious military operations were those carried on in Britain, where his name remains associated with a military wall constructed between the Forth and the Clyde. Under Antoninus the principles of equity, fortified by the prevailing Stoic philosophy, were more widely introduced into the Roman system of law, and the harsh code which governed the relations between freemen and slaves was considerably mitigated. The provinces were well governed, the arts and sciences encouraged, salaries paid to professors of philosophy and rhetoric, and persecutions of the Christians checked. Antoninus died March 7, 161.

**Antonio.** Character in Shakespeare's comedy, *The Merchant of Venice*. The plot hinges on his generosity in borrowing money for his friend Bassanio from Shylock the Jew, on condition that, if the money be not repaid at the appointed time, he shall forfeit a pound of his flesh.

**Antonio** (1531-95). Pretender to the Portuguese throne. A natural son of Louis of Beja, second son of Emanuel I of Portugal, Antonio was unsupported by nobles or populace in his claim to the throne. In 1580 he was defeated at Alcantara by Philip II of Spain, and fled to Paris with the crown jewels, among which was the famous Indian diamond later called the Sancy diamond. After making an attempt on the Azores in 1582, and accompanying a futile English expedition against Portugal in 1589, Antonio returned to Paris, where he died Aug. 26, 1595. He received the wealthy priory of Crato in youth, but was never ordained.

**Antonio, ANTONELLO D'** (c. 1414-93). An Italian painter, called Antonello da Messina. He was born at Messina, and after study in Rome and Naples went to Bruges to learn from Jan van Eyck the new method of painting in oils.

He settled in Venice, where he died. He introduced oil painting among the Italians, and happily blended the somewhat hard manner of the Flemish school with the softness and suavity of the Italian. His *S. Jerome in his Study*, in the National Gallery, London, is perhaps his masterpiece, and the *Portrait of a Young Patrician*, at Venice, is also remarkable.

**Antonius, MARCUS** (c. 83-30 B.C.). Roman statesman and soldier, commonly referred to as Mark Antony. He was of patrician birth and related through his mother to Julius Caesar. In spite of reckless dissipation, his brilliance and daring were recognized by Julius, of whom he became the whole-hearted partisan and by whom he was rapidly advanced. He commanded the left wing of the army of Julius which overthrew Pompey at Pharsalus in 48 B.C. In 44, just before the murder of the dictator, Antony was named his colleague in the consulship. After the murder, the conspirators did not realize how dangerous he was, and he soon took up arms at the head of the Caesarian party. He sought the alliance of Julius's adopted son Octavian, and for a time the future rivals made common cause. They compelled their own appointment, with a subordinate colleague Lepidus, as triumvirs for the restoration of the commonwealth; in effect they were a commission with unlimited authority. Butchering by a proscription their personal enemies, including Cicero, they turned their arms against Brutus and Cassius and the republicans, who were crushed at Philippi, Oct., 42.

The victors, practically ignoring Lepidus, now divided the Roman world, Octavian taking the west and Antony the east. Within two years there was a serious breach, but war was averted by temporary reconciliation. Antony became enslaved by the fascination of the Egyptian queen Cleopatra. But the partition of the Roman world was intolerable to both Octavian and Antony, and in 31 they joined battle for mastery. The victory fell to Octavian's fleet, under the command of Agrippa, in the sea-fight off Actium, Sept. 2; and Antony fled back to Egypt with Cleopatra. He had become incapable of sustained effort, and on the arrival of Octavian next year he put an end to his own life, an example immediately followed by Cleopatra; which secured the complete predominance of Octavian in the Roman empire.

Antony's character is admirably portrayed in Shakespeare's two plays, *Julius Caesar* and *Antony and Cleopatra*; and Dryden's *All for Love* dramatises his relations with the Egyptian queen. See *Augustus*; *Caesar*; *Cleopatra*.

The grandfather of Marcus Antonius bore the same name and was a lawyer and orator (143-87 B.C.). He distinguished himself against the pirates of Cilicia, of which he was governor in 103. He was consul in 99 and censor in 97. A supporter of Sulla and the aristocratic party, he was put to death by Marius. Cicero ranked him as an orator with the greatest of Greece.

**Antonomasia** (Greek *anti*, instead: *onomazein*, to name). Use of a descriptive epithet in place of a proper name. Examples are "His Grace of Canterbury" for the archbishop, "the honourable member for ——" instead of the name of the M.P. referred to, "the swan of Avon" for Shakespeare, or "the inspired tinker" for Bunyan.

**Antony and Cleopatra.** Tragedy by Shakespeare. Antony had met Cleopatra when he was triumvir with Octavius and Lepidus. For her he neglects his first wife, Fulvia, and his second wife, Octavia, sister of Octavius. He quarrels with his brother-in-law for expelling Lepidus from the triumvirate, is defeated by him at the naval battle of Actium, and then, deserted by his friend Enobarbus (Ahenobarbus), after witnessing the surrender of the Egyptian fleet and receiving a false report of Cleopatra's death, falls upon his sword and dies in her arms. Cleopatra, to avoid gracing Caesar's triumph, kills herself by applying asps to her arm and breast.

The play, probably first performed in 1607, was first printed in the First Folio, 1623. Its source is North's version of Plutarch's life of Antony, many passages of which it reproduces almost verbatim. It is Shakespeare's second love tragedy and contains some of his most superb and exultant dramatic poetry. The rapid changes of scene, from Alexandria to Rome and back again, with brief scenes in other places, give it also a world-wide range and great speed. Antony is the great soldier throughout, and Cleopatra, unsparingly drawn as the courtesan of genius in the first three acts, is the great queen of Egypt in the last. Dryden's *All for Love* is another tragedy based on the same theme.

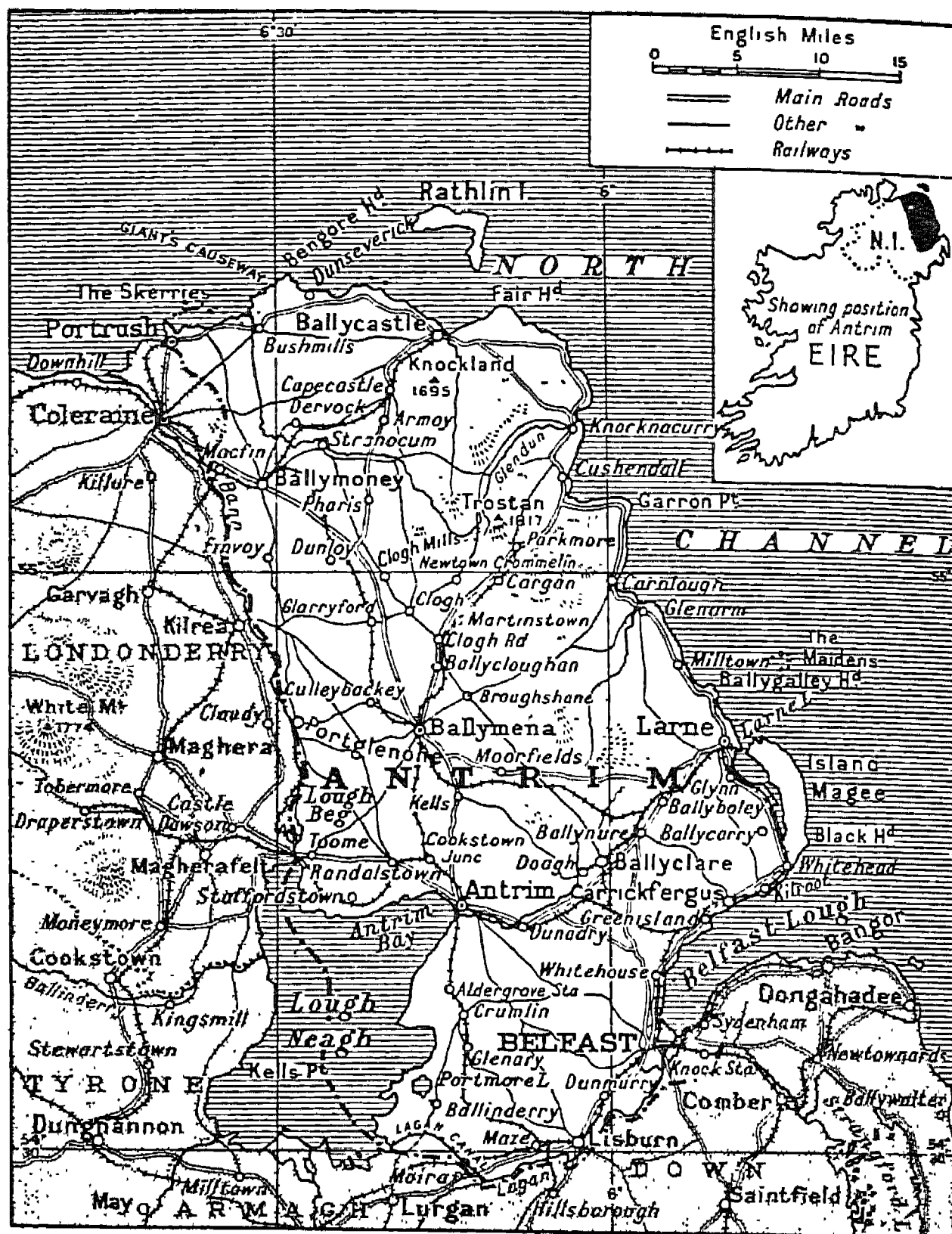


**Antonym** (Gr. *anti*, against; *onyma*, name). Word bearing the opposite meaning to that of another word. It is peculiarly effective in the statement of a contrast, *e.g.* A bliss in proof, and prov'd, a very woe (Shakespeare, sonnet 129), where woe is the antonym of bliss. An antonym is thus the converse of a synonym (*q.v.*). Many dictionaries of synonyms and antonyms have been compiled.

**Antraigues**, EMMANUEL HENRI LOUIS ALEXANDRE DE LAUNAY, COUNT D' (c. 1755–1812). French political agent. After several years of travel he went to Paris, where in 1788 he published his revolutionary Memoir on the States-General. At the outbreak of the Revolution he was elected deputy, but quickly changed his opinions. In 1790 he left France and intrigued on behalf of the Bourbons at the European courts. In 1803 he was sent by Alexander of Russia to Dresden, but was dismissed for writing an anti-Bonapartist pamphlet. He settled in London, and is said to have divulged to Great Britain the secret articles of the treaty of Tilsit. He and his wife were murdered near London, July 22, 1812, by an Italian servant. He encouraged the two Montgolfier (*q.v.*) brothers in their early experiments in aeronautics.

**Antrim**. North-east maritime and most populous co. of Northern Ireland. Its greatest length is 65 m., greatest breadth 30 m., coast-line 90 m., and land area 1,098 sq. m. Rathlin Island and the Skerries, off the N. coast, and the Maiden rocks with two lighthouses, off the E. coast, form part of the co. The chief rivers are the Bann and Lagan, and Lough Neagh is the largest lake. The surface is hilly in the N. and E., and attains its highest alt. in Trostan Mt. (1,817 ft.); much of the interior is bogland. On the north coast is the Giant's Causeway (*q.v.*), a remarkable example of columnar basalt formations.

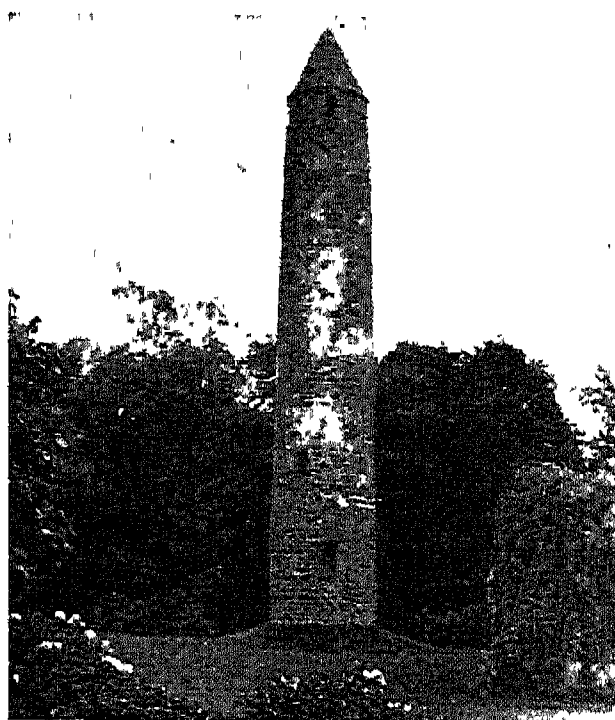
The centre of the linen industry, Antrim has also cotton and woollen manufactures, while oats, potatoes, flax, and cereals are grown in considerable quantities. Good rock salt is obtained near Carrickfergus, iron ore, limestone, and coal are worked, and salmon fishing and distilling engaged in. Belfast, the metropolis, Lisburn, Carrickfergus, Ballymena, Ballymoney, Larne, Antrim, and Portrush are the principal towns. Apart from Belfast, Antrim returns 2 M.P.s to



Antrim, the most populous county of Northern Ireland. It is on the N.E. coast, and in its most northerly part is the Giant's Causeway

Westminster, 7 to the N. Ireland parliament. Pop. excluding Belfast (1951) 231,099. That nearly half are Presbyterians is due to colonisation from England and Scotland under James I.

**Antrim**. Market town of Antrim, N. Ireland. It is 22 m. by rly. N.W. of Belfast, near the N.E.



Antrim. One of Ireland's mysterious ancient round towers is found near Antrim. It is 95 ft. high

shore of Lough Neagh. Linen, paper, and woollen goods are made. Near are Antrim Castle, Shane's Castle, and a well-preserved round tower. Market days, Tues. and Thurs. Pop. (1951) 1,660.

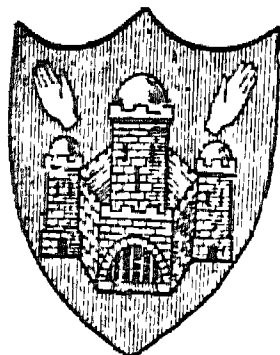
**Antrycide**. Synthetic drug developed 1946–48 by British scientists as a prophylactic against nagana (trypanosomiasis), a disease transmitted to cattle by the tsetse fly. Laboratory tests were so successful that the drug was expected to transform great tracts of Africa infested by the tsetse into cattle-rearing regions. But large scale field trials failed to realize the hopes raised.

**Antsirane**. Malagasy name of Diego Suarez (*q.v.*), a port of the French island of Madagascar. It was the site of a British landing during the Second Great War when in 1942 the Allies decided to take over control of Madagascar from the Vichy govt.

**Antung**. City of China, capital of Liaoning province, Manchuria. It was a former treaty port, and lies at the mouth of the

Yalu river, on its right bank. It is a timber centre and has a trade in wheat, soya beans, and other agricultural produce. Pop. (est.) 200,000. During 1945-50 it gave its name to a province covering part only of Liaoning province.

**Antwerp.** Second city and chief port of Belgium, one of the great ports of the world. On the right bank of the Scheldt, 55 m.



Antwerp arms

from the sea and 27 m. by rly. N. of Brussels, it is the capital of the province of the same name. Pop. (1947) city, 308,162; prov., 1,281,333. Although it has manufactures of cloth, cotton, and silk goods, as well as diamond cutting and other industries, it is chiefly famous as a centre of import and export. While a great tidal river available for ships of the largest tonnage flows past its quays, it is situated 2° E. of Paris, and is the Continental Atlantic seaport nearest to the heart of Europe. An extensive canal system makes Antwerp the great port for the industries of the Rhine as well as of Belgium itself.

**HISTORY.** The name (French Anvers, Flem. Antwerpen) is variously derived from the practice of punishing pirates by cutting off their right hands and throwing (*werpen*, to throw) them into the Scheldt, said to have been enforced by Brabo, a semi-mythical governor in the early Frank period; and from *an 'twerp*, on the wharf. There is no positive authority for either derivation. The arms of Antwerp (*v.s.*) show two severed hands and a castle; and a statue in the city commemorates the Brabo legend.

In its early days, Antwerp was a stronghold or barrier fortress against the raids of piratical invaders. It was attacked several times by the Norsemen; in 836 they captured and burnt the town. It recovered, and in the next century was made into a marquessate to protect the German frontier from attacks by the counts of Flanders. In the 12th century it joined the Hanseatic League, thus beginning its rôle as a commercial rather than political metropolis. For three centuries it was less important than Bruges, which had access to the ocean by the Zwyn, an arm of the sea navigable by the largest ships of the period. This channel began to be sandlocked early in the 15th century.

and the completion of the process, which undermined the prosperity of Bruges, was followed by the transfer of the foreign guilds in 1490 to Antwerp. For some years it was the most important commercial city in Europe. A thousand foreign merchants occupied as many separate houses, and among the most famous was Sir Thomas Gresham. These houses were divided among seven nations: English, French, Spaniards, Italians, Portuguese, Germans, and the Danes and the Hansa counted together. The population exceeded 200,000, and hundreds of ships entered and left the port during the year. Spices, sugar, silk and gold embroideries, wine and grain were imported in great quantities, and highly valued Flemish carpets, textiles, and gold and silver articles were sent to India, Arabia, and Persia.

Then Antwerp became involved in the wars of religion in the 16th century, and her fortunes declined with those of Spain. The duke of Alba built the first modern citadel on the site of the margrave's castle, but he forgot to pay his men regularly, and they mutinied. The soldiers sought to pay themselves by plundering the citizens. The Spanish Fury of Nov., 1576, raged for three days, when 6,000 citizens were massacred. Then followed a great exodus of the people. A second blow was inflicted in 1585 by Parma, when, on capturing the city, he ordered that all who adhered to Protestantism should leave within a specified period. Thirty thousand emigrated. The treaty of Westphalia, 1648, gave the United Provinces

both sides of the Scheldt estuary, which they closed to Antwerp, still in Spanish possession.

During the 17th and 18th centuries Antwerp sank into complete insignificance, and it was said that one-third of its inhabitants lived on charity. The treaty of Paris, 1814, opened the Scheldt to all nations; that of 1839, which created Belgium, laid down the principle of free navigation under joint Dutch-Belgian control, but gave the Dutch the right to levy a small toll, abandoned in 1863 for an indemnity from interested nations. The Dutch closed the estuary to belligerents during the First Great War; during the Second it was in German hands from 1940. (For the opening of the estuary to Antwerp in 1944, see Scheldt.)

During the First Great War, Antwerp was in German occupation from Oct., 1914, until Nov., 1918. (See also Antwerp, Siege of.)

#### Description of City

In respect of public buildings, monuments of antiquity, broad boulevards, and residential mansions, Antwerp is not surpassed by any other city in Belgium. The old enceinte was removed in 1859 to give place to the new boulevards which form a crescent round the eastern side of the city, and two large suburbs were then incorporated. A famous street is the Place de Meir, which contains the royal residence, used, however, only on rare occasions. Here also stood the house of Rubens.

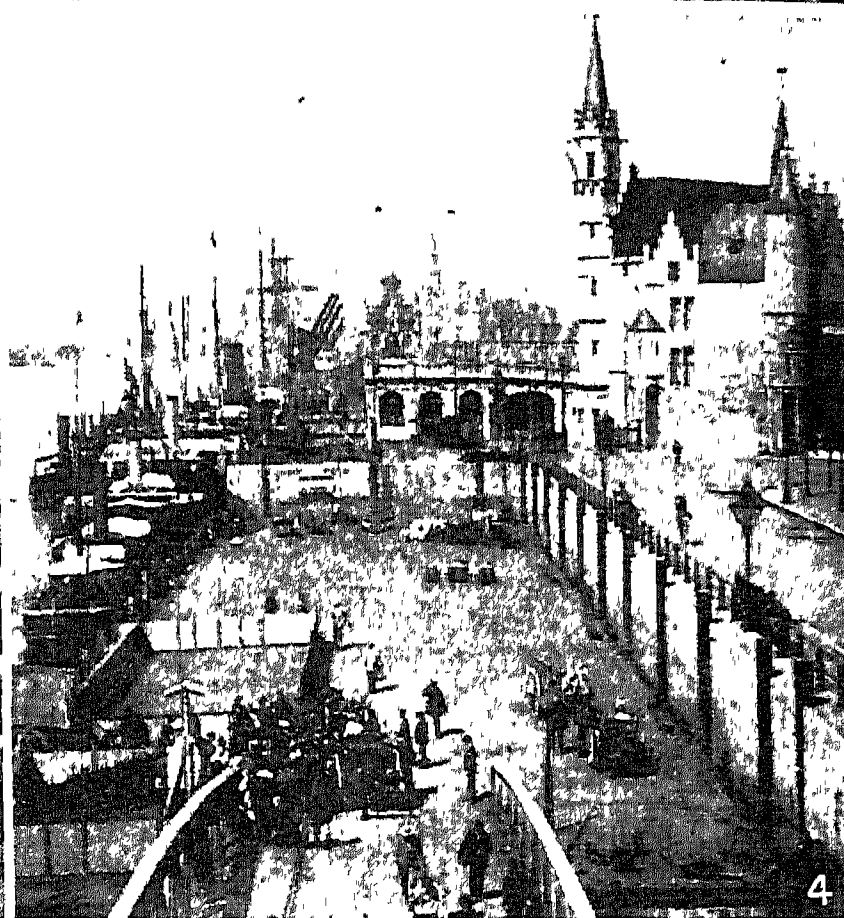
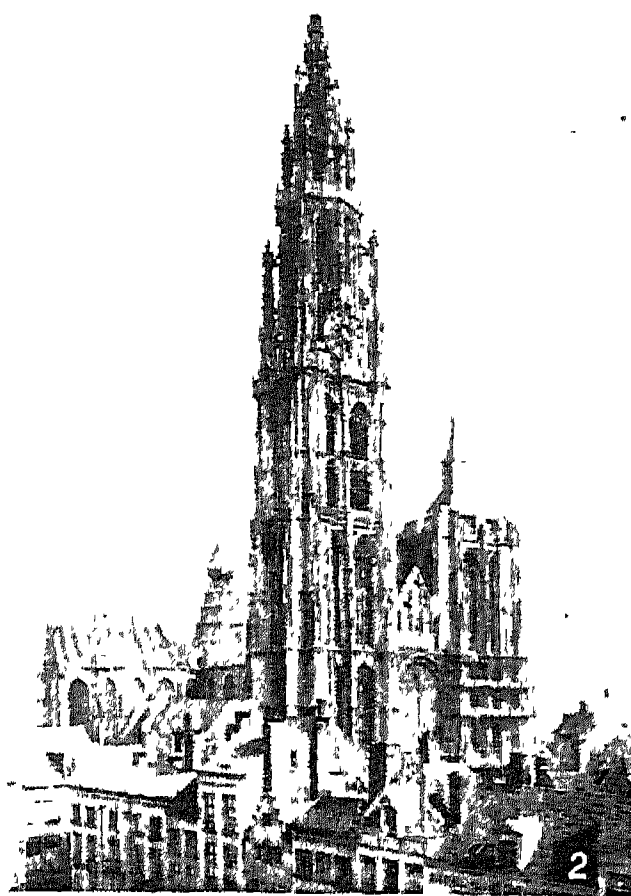
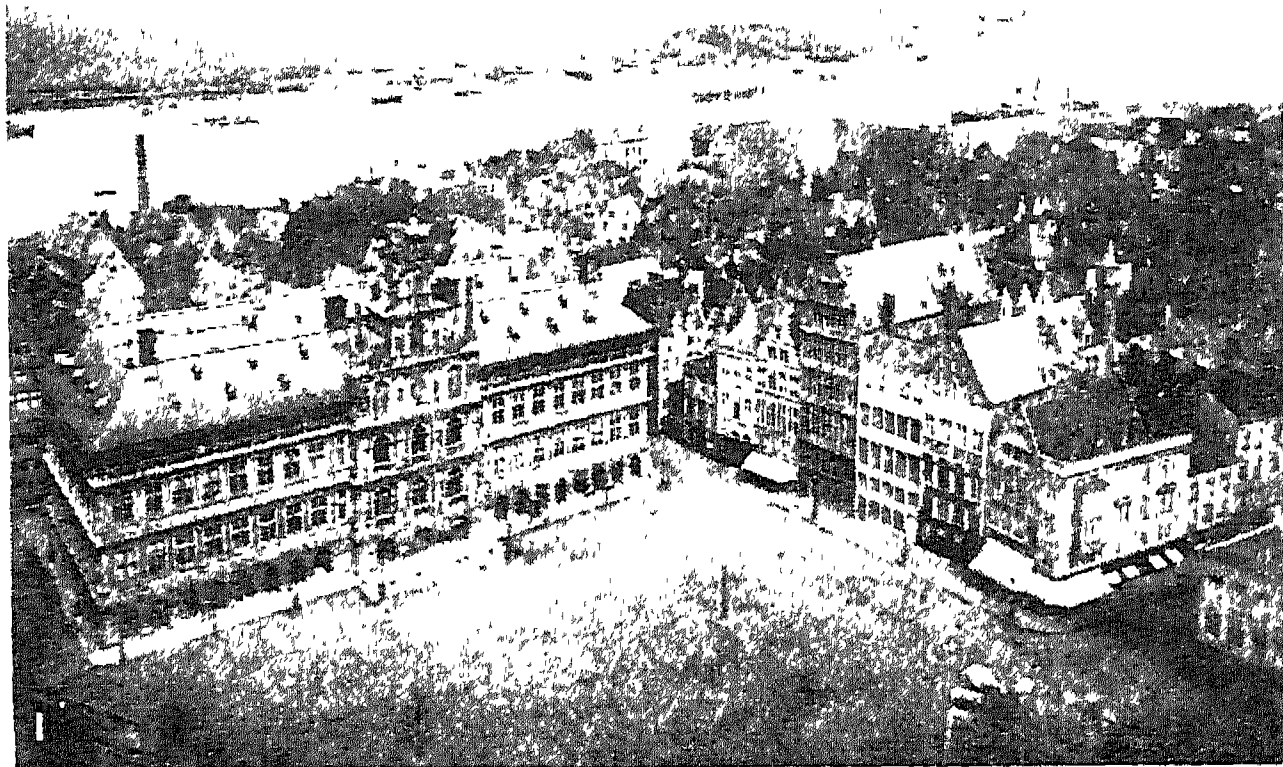
The most famous old building is the magnificent cathedral of Notre Dame, begun in 1352 but

not completed until 1518, the choir being added about 1550. The tower with its spire is 470 ft. high. The cathedral, in its beautiful design, has been compared to point lace. It contains some old glass, a fine pulpit, and masterpieces of Rubens. In the church of S. Jacques, completed in the 15th century, is the chapel of the Rubens family, and his painting of his family in



Antwerp. Plan of the main part of this Belgian city and port





Antwerp. 1. The square of the Hôtel de Ville, looking across the Scheldt. 2. The Cathedral. 3. Place de Meir, showing the Torengebouw (tower building). 4. The Steen (part of the old castle, now a museum) with the quays

an allegorical form, including himself in the guise of S. George.

The Guild Houses, the Hôtel de Ville, and the Plantin Museum all date from the 16th century. The last named was the residence and workshop of the great printers, Plantin and Moretus, and was sold to the city in 1876. The Steen on the quay represents the old castle. It has undergone a modern restoration, but the dungeons are at latest of the 10th century.

Among modern buildings may be named the Royal Museum, the Flemish Opera House, the Law Courts, and the National Bank. The museum, 1879-90, has a superb collection of paintings by the old masters, including many of the early Flemish school, and some 500 works by modern painters. Thoroughly modern in equipment are the quays which extend for 5 m. along the right bank of

the river. The Zoological Gardens rank among Europe's best.

In 1955, 158 shipping companies regularly used the port which has more than 30 m. of quays with room for 260 sea-going ships; and a system of 27 docks connected with the river by sea-locks. Well-equipped for the storage of grain, Antwerp is one of the chief grain distributing centres on the Continent. Some 12,000 ships enter the port annually; a quarter are British. A petroleum storage dock, with two large refineries, was constructed in 1952. A few miles upstream are large shipbuilding yards.

#### Antwerp : 1940-45

In the Second Great War Antwerp fell into German hands on May 18, 1940, without having played any direct part in the defence of Belgium.

While the city was in German occupation little information came

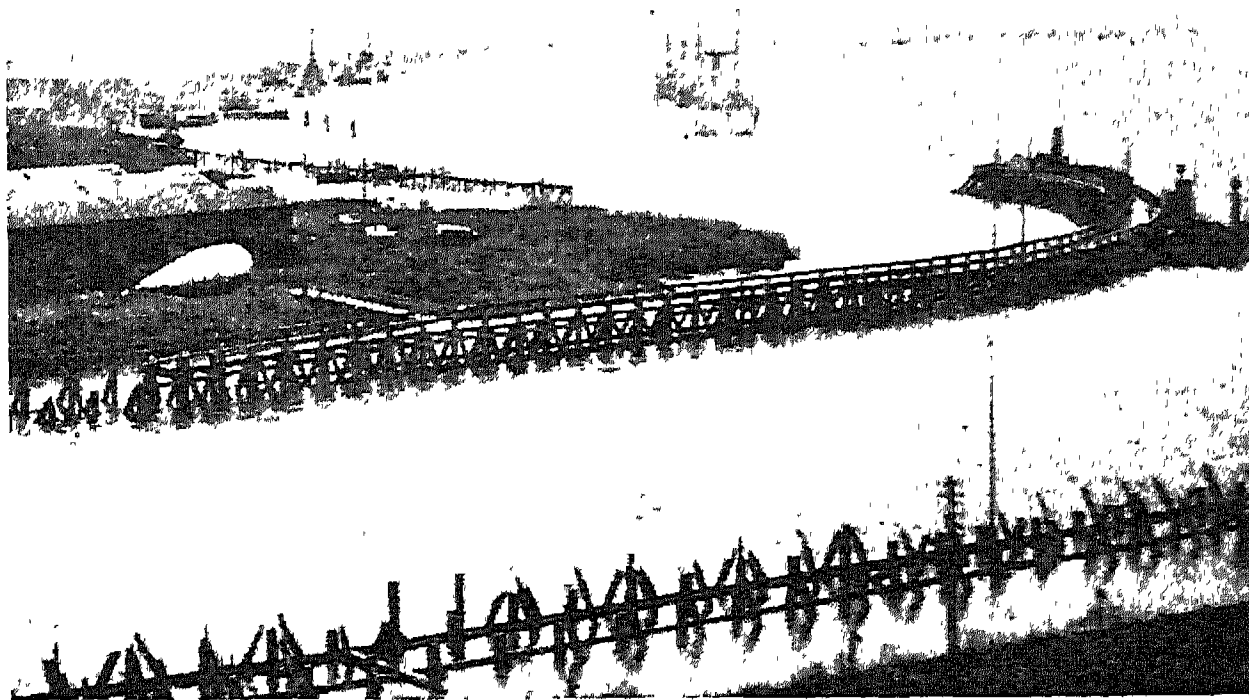
out. In the summer of 1940 the enemy concentrated in the port and estuary numbers of barges and similar craft for the projected invasion of Britain. These vessels were repeatedly bombed by the R.A.F., and during the ensuing years of the war there were frequent attacks by Allied aircraft on military objectives in the neighbourhood. After the Allied landings in Normandy during June, 1944, and the subsequent operations that led to the reconquest of France and Belgium, the city and port of Antwerp became a major objective as a potential supply base for the Allied invasion of Germany.

Though Antwerp was liberated from the Germans on Sept. 4, 1944, the port could not be brought into use until enemy forces occupying the islands of the estuary had been expelled, and Allied control estab-

lished over the estuary of the Scheldt. By the middle of November this had been accomplished, after nearly two months' fighting against desperate German resistance. On Nov. 26, Antwerp began again to receive ocean-going ships, and soon became one of the chief supply bases for the Allies. So far the damage inflicted on the city had mainly consisted of destruction by German artillery fire in the port district and the suburb of Merxem. The Torengbouw (tower building) of the Boerenbond (farmers' society) was also damaged. Two tunnels under the Scheldt were rendered unusable by the Germans before they left. But between Oct., 1944, and March, 1945, Antwerp became a target for German flying-bombs, 700 of which fell in the area. Half the total number of houses in Antwerp were destroyed, while 5,000 people were killed and 21,000 wounded. The object of these attacks was the destruction of the port to prevent Allied supplies going through. British troops of the Pioneer Corps and the No. 1 Overseas column of British Civil Defence were in action in Antwerp throughout the period.

**Antwerp, SIEGE OF, 1914.** This was one of the most significant operations of the first autumn of the First Great War because of its bearing on the "race to the Channel ports." It was begun by the German General von Beseler with 125,000 men on Sept. 27, 1914. The forts guarding Antwerp were shown at once to be powerless against the huge German guns, and the Belgians prepared to evacuate the city, but to defend Termonde and the country W. of the Scheldt, so as to keep a line of retreat open for their field army, 100,000 strong.

On Oct. 3 Mr. Winston Churchill arrived from London with a promise from Great Britain and France that, if the defence of the city could be prolonged three days, they would inform Belgium whether or not a relieving army could be sent and in what strength. In any event the British 7th division would be moved to Ghent to cover the Belgian retreat, and naval brigades and heavy guns dispatched to Antwerp to assist in protracting the resistance. Some 2,200 British marines arrived late on Oct. 3, followed by 6,000 men of the Royal Naval Division, mostly without proper equipment, on October 5-6.



Antwerp. First ship of an Allied war convoy to arrive in the great Belgian port after the freeing of the Scheldt estuary by the British in November, 1944

From Oct. 6, however, the bombardment was intensified; the Belgian field army withdrew towards Ghent; officials, refugee civilians, and troops poured out of Antwerp; and on Oct. 9 the city surrendered and was entered by the Germans. About 200 civilians had been killed, while the British losses were 37 killed, 193 wounded, 1,560 interned in neutral Holland, and 800 prisoners. Yet the movement of a British force to Antwerp had prolonged by some days the resistance of that place, and detained a large German force which otherwise might have pushed through Ypres to the sea and captured the Channel ports.

**Anu** OR **AN.** Sky god of Sumerian and Babylonian mythology, one of the great creator-gods of the ancient pantheon. Erech was the centre of his worship; here temples were erected to Anu and his consort Antu, an aspect of Ishtar (*q.v.*).

**Anuak.** Nilotic Negro people, est. at c. 45,000, whose villages lie along the Akobo and neighbouring rivers in E. Sudan and W. Abyssinia. Their political unit is the village; authority is vested in the

headmen in the W., in the nobles and king in the E. Clans are patrilineal but non-exogamous. Their religion includes a supreme creator, influenced by sacrifice.

**Anubis.** Egyptian deity. Reputed son of Osiris and Nephthys, he was primarily a twilight god, later identified with Hermes. Represented as jackal-headed, he was the guardian of the dead, and presided over embalmings. Under the New Empire he watched the scales at the weighing of souls before Osiris in the under-world.

**Anuradhapura.** Ruined city of Ceylon. It is 84 m. N. of Kandy on the rly. from Colombo. The capital of Ceylon from 437 B.C. to A.D. 750, it is famed for its ancient monuments and its Bo tree. Its jungle-covered ruins were cleared by the British govt. during the 19th century, revealing remains of many temples, palaces, and monasteries.

**Anvil.** Commonly a block of iron having a flat steel surface upon which metals are forged or wrought by hammering, as by blacksmiths, goldsmiths, etc. At one end there is a conical projection termed a beak or horn, for use in bending operations. Heavy anvils are mounted upon wooden foundation blocks; those for steam or power hammers, and for punching and other machines, are embedded to a considerable depth and supported upon piles of masonry.

**Anzac.** Popular designation of the troops from Australia and New Zealand who fought in the First and Second Great Wars. The word Anzac was derived from the initial letters of the words Australian



Anubis,  
Egyptian deity  
British Museum



and New Zealand Army Corps in the First Great War. On April 25, 1915 (a date commemorated annually by Australians and New Zealanders as Anzac Day), they landed at a cove just N. of Gaba Tepe (Kaba Tepe), Gallipoli, which they named Anzac Cove.

Acts passed in the U.K. and in Australia prohibited the use of the word for trade.

**Anzani, ALESSANDRO** (1877-1956). Italian aero-engine designer. Born Dec. 5, 1877, near Milan, where he was trained as an engineer in his father's workshops, he migrated to France in 1902, and in 1904 designed and built the first radial aero-engine. A 25-h.p. Anzani radial engine powered the monoplane in which Blériot made the first aeroplane crossing of the English Channel in 1909; and in 1913 Handley Page used an Anzani 40-h.p. engine in one of his aircraft. At the outbreak of the First Great War seven types of Anzani radials were in use, ranging from 3-cylinder 30 h.p. to 20-cylinder 200 h.p. With subsequent development of the in-line, liquid-cooled aero-engine, the radial engine lost popularity, and Anzani turned to general engineering. He died at Merville-Franceville, near Caen, July 24, 1956.

**Anzio** OR PORTO D'ANZIO. Fishing harbour and resort of Italy, in Rome prov., the ancient Antium (*q.v.*). It is 33 m. S.E. of Rome. Near by a necropolis of the Iron Age has been excavated. Pop. (1951) 12,637.

In the winter of 1943-44, the Allied armies fighting their way slowly up the Italian peninsula were heavily engaged in the approaches to the "Gustav Line," with its strongest point at Cassino, on the west. With the aim of seizing Rome rapidly, it was decided to land well behind that line, at the little port of Anzio. To distract the enemy's attention several attacks were launched in the main battle area. On the appointed day, Jan. 21, 1944, the weather was favourable and the sea calm. The convoy of landing craft with naval and air support was apparently unobserved, for the first landings at 2 a.m. on Jan. 22, 1944, met no opposition, and by midnight 36,000 men—British and American—and more than 3,000 vehicles had been landed; by the evening of the 23rd, the whole of two divisions and their equipment was ashore. But the failure of the commander, the U.S. General Lucas, to press forward

immediately on landing (when, as it subsequently transpired, there were only two battalions of German troops between Anzio and Rome) gave Kesselring, the German c.-in-c., time to react. (Churchill, in his war memoirs, says: "I had hoped we were hurling a wild cat on the shore, but all we got was a stranded whale.")

In 48 hours, without weakening the Gustav Line defences, Kesselring gathered together the equivalent of two divisions to oppose the landing force; and when on the 30th the Allies launched their first major attack, aimed at Campoleone and Cisterna, it met strong opposition from an enemy by now established in a fortified line. On the night of Feb. 3-4, a strong German counter-attack forced the Allied troops back and sealed them off in a beach-head some 20 m. wide and 10 m. deep. A major German attack on Feb. 16 drove a wedge into the Allied line. A third major German attack on Feb. 29 was stubbornly held. The Anzio landing had not achieved its aim; but the Allied forces could not be pushed back into the sea, and detained a large enemy force to hold them.

The beach-head was maintained and strengthened; and because the Germans expected the next major Allied thrust when it came in May to be from Anzio, Alexander was at last able to take Cassino on May 18. The main battle front moved forward: the "Adolf Hitler Line," a few miles to the N.W., was the next objective, and on the night of May 22-23 a concerted attack was launched on the Hitler line and from Anzio. Anzio forces captured Cisterna on the 25th, and the same day an American engineer unit from Anzio met near Borga Grappa a British reconnaissance patrol from the main Allied 5th army. Losses in the Anzio beach-head were: Allied, 25,000; German, 30,000.

**Anzoategui.** State of Venezuela. It is a well watered plain with a tropical climate, bounded N. by the Caribbean Sea, W. by Guárico, E. by Monagas, and S. by the Orinoco. Cattle-raising is the chief industry, coffee, coal, and hides are the principal products; it also has petroleum deposits. Barcelona is the capital; its ports are Guaula and Puerto La Cruz. Area 16,720 sq. m. Pop. (1950) 238,082.

**Aomori** OR AWOMORI. Harbour of Japan, on the N. shore of Honshu island. It is the terminus for a railway-operated ferry

service to Hakodate, Hokkaido. Capital of the northernmost prefecture of Honshu, it became an open port 1906. It is a lumbering centre and its exports include rice, textiles, and metal goods. Pop. (1947) 90,828.

**Aorta.** Main artery of the body. It arises from the left ventricle of the heart, and having passed over the root of the left lung, descends in front of the vertebral column into the abdomen. There it divides into the two common iliac arteries.

**Aosta.** City of Italy, capital of Valle d'Aosta region. The ancient Augusta Praetoria Salassorum, it stands at the confluence of the Dora Baltea with the Valpelline, 49 m. direct and 80 m. by rly. N.N.W. of Turin. Its strategic position at the junction of the routes over the Great and Little St. Bernard passes induced Augustus to found a military colony here in 25 B.C. Its Roman walls are well preserved. It has a cathedral dating from various centuries, the church of Sant'Orso, dating from the 5th but rebuilt in the 12th century, a 15th-century priory, and ruins of a Roman theatre, amphitheatre, baths, bridges, etc. It trades in wine, leather, and cheese. Pop. (1951) 24,701.

The Valle d'Aosta, most of whose inhabitants are French-speaking, was made an autonomous region in 1948. It has important hydro-electric installations which serve northern Italy and, thanks to the iron mines of Cogne, has great metal industries. A mountainous region, it is also a centre of the tourist industry. Area 1,260 sq. m. Pop. (1951) 95,634.

**Aosta, DUKE OF.** Italian royal title. It was granted by Charles Albert, king of Sardinia, to his grandson Amadeus (1845-90), the 2nd son of Victor Emmanuel II (1820-78), first king of Italy. Amadeus was king of Spain 1870-73. The next duke of Aosta was his eldest son, Emmanuel Philibert (1869-1931); in the First Great War he led the 3rd Italian army, and was chiefly responsible for the capture of Gorizia from the Austrians in 1916.

His elder son, Amadeo Umberto (1898-1942), 3rd duke, cousin of Victor Emmanuel III of Italy, was born Oct. 21, 1898. In 1927 he married Anne of France, daughter of the duke of Guise, and ten years later succeeded Graziani as viceroy of Abyssinia. On Italy's entry into the Second Great War in 1940 he was appointed Italian c.-in-c.,

East Africa. In April, 1941, he and his government fled from Addis Ababa before the British Imperial forces entered the city. They retired to Amba Alagi, where on May 16 he asked for an armistice and, with his 18,000 troops, surrendered to the British. He was sent as a prisoner to Kenya, where he died March 3, 1942. His younger brother Aimone



Amadeo Umberto,  
3rd Duke of Aosta

(b. 1900), created duke of Spoleto 1904, married Princess Irene of Greece in 1939. On May 14, 1941, he was proclaimed King Tomislav of Croatia at the instigation of Mussolini, though he never visited his kingdom, and in 1943 renounced all pretensions to the throne. He succeeded Amadeo as duke of Aosta.

**Apache.** Group of North American Indian tribes formerly occupying parts of what is now New Mexico, Arizona, and Texas. Of Athapascan stock, their name (Zuni, enemy) properly denotes their Navaho neighbours. Daring horsemen, they caused much trouble in the U.S.A. until rounded up into reservations. They number about 6,500. *Pron.* ap-ach'-ee.

The name Apache (*pron.* ap-ash) was assumed by Paris hooligans, who became obnoxious by resorting to murder and outrage. One of the most notorious apaches was a Russian, a native of Pskov, who, before becoming known to the Paris police as Peter Piatkov, had been a house-painter at Marseilles. The *Danse d'Apache*, a portrayal of the hooligan costume and temperament, was first presented by Max Dearly and Mistinguett at the Moulin Rouge, Paris.

**Apalachee Bay.** An arm of the Gulf of Mexico, in N. Florida, U.S.A. About 30 m. across, it receives several small rivers, among them the Ochlockonee and St. Mark's. Mean depth c. 18 ft.

**Apalachicola.** River of Florida, U.S.A. Formed by the confluence of the Chattahoochee and Flint rivers, at the S.W. extremity of Georgia, it flows S. to the Gulf of Mexico, through the Bay of Apalachicola. It is navigable by steamers throughout its 112 m.

The city and port of Apalachicola, at its mouth, exports lumber, naval stores, and cotton. It is on the Apalachicola Northern rly. Pop. (1950) 3,222.

**Apam.** Town of Mexico, in the state of Hidalgo. It stands on an elevated tableland at an altitude of 8,205 ft., 57 m. by rly. N.E. of Mexico city. The town is an important depot for pulque, Mexico's national drink, made from maguey, or agave, grown near by. Pop. (1950) 12,474.

**Apanage** OR APPANAGE (Lat. *panis*, bread). Originally, a portion of land or property set aside by the kings of France for the support of their younger sons. It came to mean a perquisite, something attached to something else; for instance, Easter offerings are an apanage of a church living.

**Apapa.** Port and trading estate of Nigeria, in the Western Region. Situated on the mainland opposite Lagos Island, with which it is linked by ferry, it has a dockyard and a floating-dock for the building and maintenance of inland and sea-going craft. Large extensions to the docks were begun in 1950.

**Aparri.** Town of the Philippine Republic. It stands on the N.E. coast of Luzon, at the mouth of the Cagayan river. It is subject to earthquakes. The only practicable harbour in N. Luzon, it was in the Second Great War the first landing place of the Japanese, Dec. 10, 1941, and the last port recaptured from them, June 23, 1945.

**Apartheid** (Afrik., separateness). Term used in South Africa by the Nationalist party for their policy of segregating the different "racial" groups of the Union's population—whites (called by the Nationalists Europeans), full-blooded Africans (natives), half-castes (coloureds), and persons of Asian, chiefly Indian, origin (Asiatics). Apartheid involved (1) designation of special areas of residence for the different groups, with compulsory removal of those (even when freeholders) who happened to live in another area; (2) separation of the groups in public transport, education, and training; (3) absolute prohibition of sexual connexion between members of different groups, both in and out of marriage; (4) granting of full political rights to whites only. *Pron.* (approx.) ap-ar'-tait.

**Apatite.** Fluoro- or chlorophosphate of calcium. It is common as a minor mineral constituent of most igneous and many metamorphic rocks, occurring as small colourless or bluish-green crystals. It is present in workable quantities in pegmatite-veins in Ontario and Norway, and in an igneous rock-complex in the Kola Peninsula, N. Russia. It is an important source of fertiliser.

**Ape.** Term applied to any member of the group of mammals which are included, with man, in the super-family Hominoidea of the Primates (*q.v.*). Apes resemble man closely in a number of salient features, including many details of the skull, skeleton, and dentition. the relative size of the brain, the absence of a tail, the tendency towards an erect posture, and the possession of real hands for grasping, with nails instead of claws, small ears, and a mobile expressive face with closely set eyes. They also show affinities to man in many physiological processes.

Modern apes lead a predominantly arboreal life, feeding on leaves and fruits; they have extremely long and powerful arms and elongated fingers, by means of which they swing rapidly from bough to bough (brachiation), while the hind limbs are relatively short. A number of extinct forms are known from fossil records, but there are only four living genera: Gibbon, Orang-Utan, Gorilla, and Chimpanzee (*qq.v.*). They have a low forehead, prominent brow ridges, large canine teeth, and a receding chin.

Fossils have been found in Africa, Asia, and Europe which represent various stages in the ancestry of the modern apes. They are all more primitive and less specialised; in particular, the few limb bones found indicate that they spent more time on the ground and were not so well adapted to an arboreal life. Fossil evidence suggests that modern great apes descend from African ancestors.

**Apeldoorn.** Town of the Netherlands, in Gelderland province. It is 23 m. E. of Amersfoort, and is served by canals and rly. A residential and holiday centre, it has also paper-mills, laundries, textile factories, copper foundries, soap, paint, ink, and other factories. The Oranje and Wilhelmina are the finest of several attractive parks. Near is Het Loo, the summer residence of the Dutch sovereigns; it was the favourite hunting-lodge of William III of England, prince of Orange. Pop. (1947) 83,449.

**Apelles.** Greek painter who flourished in the second half of the 4th century B.C. He was probably born at Colophon in Ionia, in Asia Minor. Court painter to Philip of Macedon and to Alexander the Great, he is credited with having discovered a very thin black varnish to preserve a painting and improve its tone,

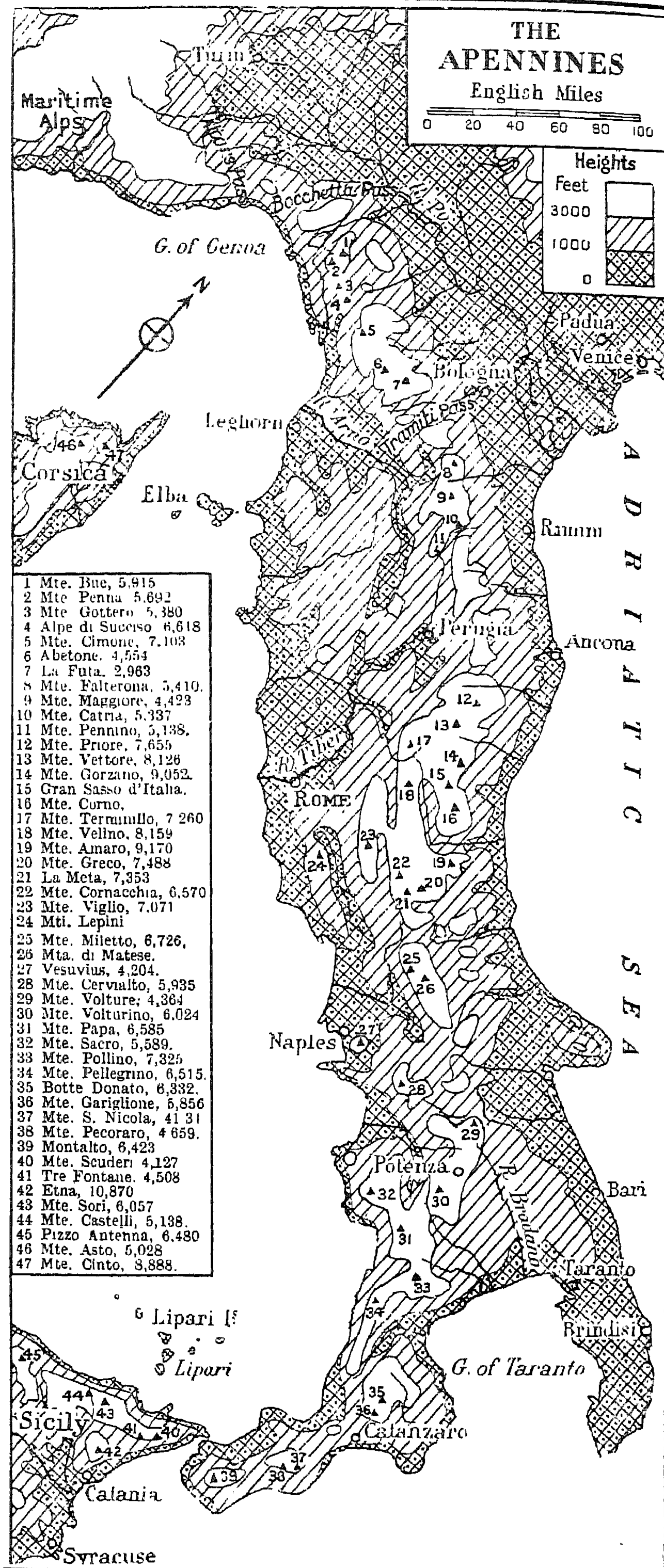


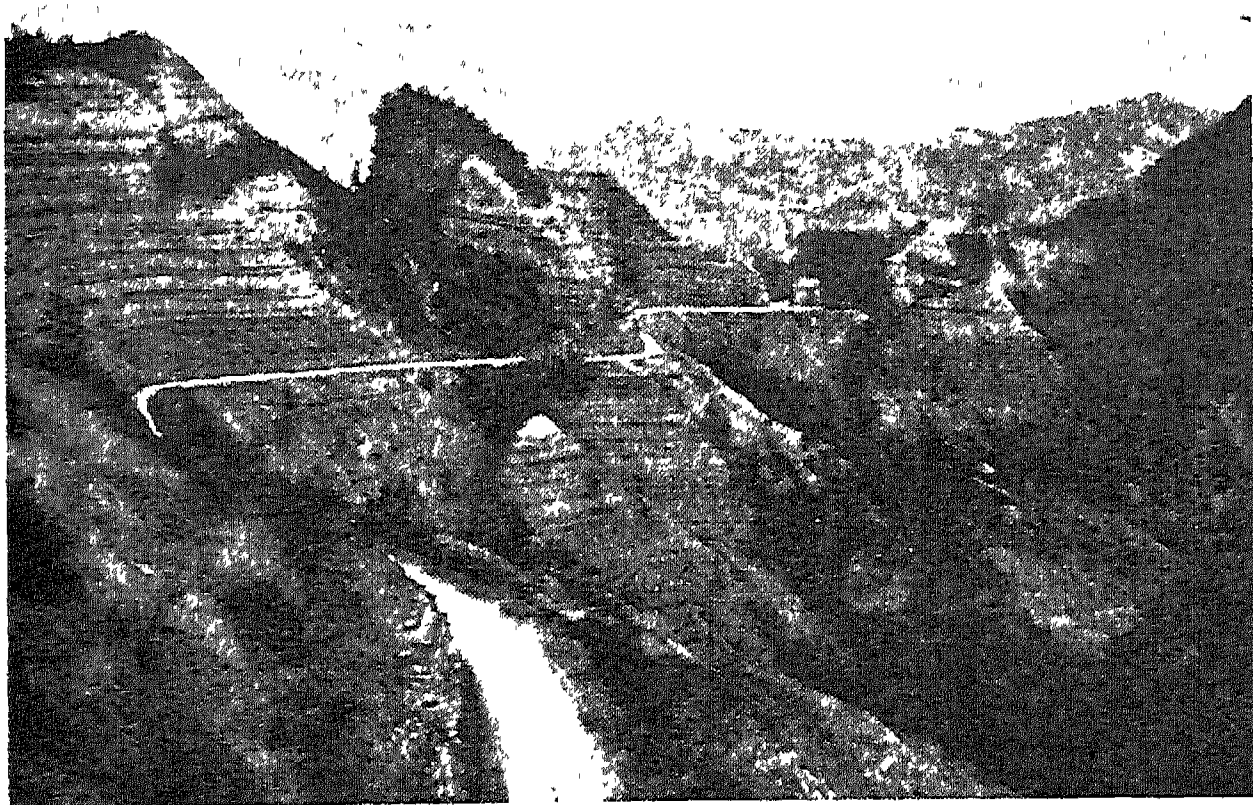
something akin to the modern glazing process. He painted on panels and not on the wall. He worked every day and impressed upon his pupils the necessity for constant practice. His theory passed into a Latin proverb: *Nulla dies sine linea* (no day without drawing a line). His pictures of Alexander the Great wielding a thunderbolt, Artemis with a chorus of maidens, and Venus Anadyomene, or Venus rising from the sea, were among the most famous works of art in antiquity. None of his works has survived.

**Apennines.** Mountain range of S. Europe, about 800 m. long. The mountains traverse the entire length of Italy and reappear in Sicily. Geographically divided into three sections, northern, central, and southern, the Apennines start from the Maritime Alps, of which they are a continuation, curve round the Gulf of Genoa, and run through the centre of Italy. In Liguria they descend abruptly to the sea and afford protection to the health resorts of the Italian Riviera. Here called the Ligurian Alps, as they traverse the peninsula they bear various local names, e.g. Etruscan, Roman, and Calabrian Apennines. They form the watershed between the Ligurian and Tyrrhenian Seas and the Adriatic Sea.

Always steep where they approach the sea, in central Italy the Apennines broaden out into parallel chains, terraces, and plateaux. They have their greatest height in Abruzzi e Molise, where the E. of the two parallel chains of the Gran Sasso d'Italia attains an alt. of 9,580 ft. in Monte Corno. Other peaks from N. to S. are Monte Cimone, 7,103 ft.; the Monti Sibillini, rising in the peak of Vettore to 8,126 ft.; Monte Terminillo, 7,260 ft., Monte Velino, 8,159 ft., Monte Amaro, 9,170 ft., Monte Pollino, 7,325 ft., and Montalto, 6,423 ft., the highest peak of Aspromonte. Among the lateral valleys formed by parallel ranges are the Florence-Pistoia, the Aterno, and the Chiana.

The Apennines are crossed by 13 principal passes, many being Roman roads, e.g. the Via Salaria and Pietra Mala; seven are traversed by rlys. There is no region of perpetual snow, and there are no glaciers. Generally monotonous, the great wall of mountains is often dreary and barren; poor grass and scrubby bushes cover large tracts. Much of the forest timber has been felled, and only where the mountains dip





Apennines. Winding road through the Mandrioli Pass, between Bibbiena and Bagno di Romagna, over the mountain range that forms the backbone of Italy

down to the sea, as in the Riviera and round the Gulf of Naples, is there rich vegetation. In Abruzzi e Molise wolves, wild boars, and occasionally bears are found in the mountains.

The Apennines lack minerals, though they contain mineral springs. Geologically they are composed of Mesozoic and Tertiary beds, including Triassic, Jurassic, Cretaceous, Eocene, and Miocene beds, containing granite, gneiss, slate, sandstone, limestone, and marble. From Vesuvius to Etna they are subject to volcanic and seismic disturbance.

**Apex.** In astronomy, a point in the heavens towards which the sun with its attendant planets is moving. In the direction of the apex, the stars (apart from their own individual motions) are apparently separating from each other owing to the sun's approach; stars in the opposite direction, towards the antapex, seem to be closing in. Around the great circle halfway between these points the apparent motion of the stars is a reflection of the solar motion. The direction of the motion can therefore be found from a study of stellar proper motions. The speed as well as the direction can be found from measurements of radial velocity. When the velocities peculiar to the individual stars are eliminated by averaging amongst a large number of stars, the sun is found to be moving at about 13 m. per sec. towards the apex in the constellation of Hercules at right ascension 18 hours, declination + 30 degrees.

**Apex.** In botany, the region at the end of shoots and roots where the tissue keeps, throughout the life of the plant, the ability to divide and produce new cells: in

other words it remains meristematic—see Meristems.

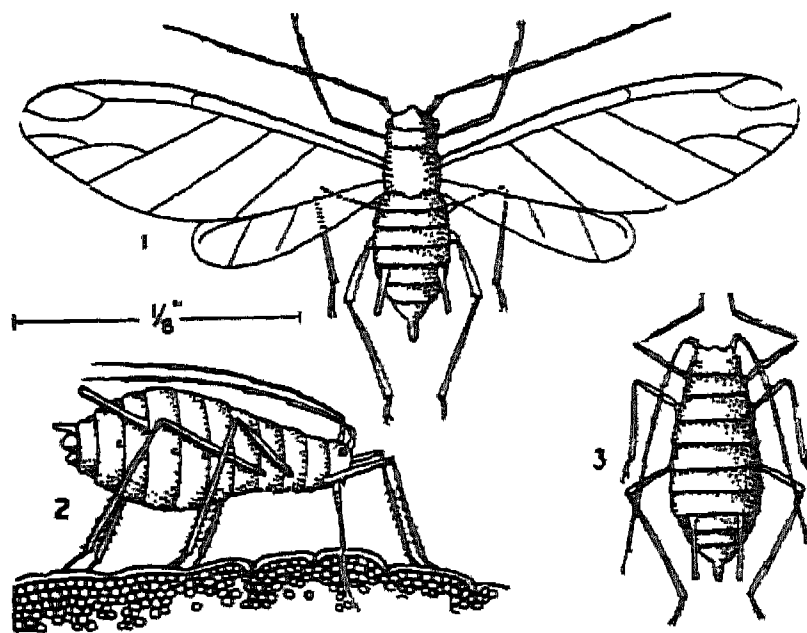
**Aphasia** (Gr., speechlessness). Disturbances of speech, of writing, and of the understanding of spoken and written words, due to disease of the brain. The patient's muscles of speech are not affected, and he may show that he understands what is said to him, but he is incapable of expressing his thoughts. Sometimes there is merely a blurring of speech or hesitancy in utterance; sometimes words are mixed up and wrong words used; the patient may be completely dumb. Capacity to read and to write is usually affected also. In aphasia resulting from an attack of apoplexy considerable power of speech may be regained as time goes on, and by re-education.

**Aphetohyoidea** OR PLACODERMI. Class of fish-like animals known only from their fossil remains. The Aphetohyoidea flourished about 300 million years ago, that is to say rather later than the most ancient vertebrate animals but earlier than the sharks and bony fish of the kinds that have persisted to this day. Study of the structure of members of one of the aphetohyoidean groups has revealed a grade of organization more primitive than that found in any living fish. Like the later fish, but unlike the more primitive lampreys, the Aphetohyoidea have true jaws and paired fins. The attachment of the jaws to the rest of the skull is primitive in that the skeleton of the so-called hyoid gill

arch is not involved but remains free. It is from this feature that the class gets its name. It is almost certain that all higher fish, and hence all land-living vertebrates including man, are evolutionarily descended from animals displaying the aphetohyoidean grade of organization.

**Aphis** OR APHID. Insect of the large family Aphididae, of the bug order Hemiptera, popularly called plant lice, green fly, black fly. They are small, seldom exceeding  $\frac{1}{8}$  inch, soft-bodied, with long antennae and a pair of cornicles at the hind end of the abdomen. They feed on plant sap through sucking mouth parts which are held inserted in the tissues for long periods. Surplus liquid, containing some sugars, is excreted through the anus forming honey-dew, which may cover leaves with a sticky film. Certain ants collect honey-dew, stroking the aphids to make them produce more. The cornicles secrete wax which in some species may cover the aphid.

Usually the eggs, laid in cracks in the bark of the winter host plant, hatch in the spring into nymphs which give rise to wingless females. After perhaps several generations, winged forms appear which fly to the summer host plant, here they produce, parthenogenetically and viviparously, winged and wingless females. There is a series of such genera-



Aphis. 1. Winged male. 2. Insect sucking sap from a leaf. 3. Viviparous female

tions throughout the summer, but in autumn females are produced which fly to the winter host and there produce wingless males and females; these, after mating, lay the winter eggs. Aphids are abundant in the north temperate zone, scarce in the tropics, and almost absent from Australasia.

**Aphonia** (Gr., voiceless). Loss of voice. When of sudden onset, it is due to hysteria and no physical disorder is found. Sufferers



may be dumb, but commonly can whisper. It may disappear spontaneously, and usually responds to psychological treatment.

**Aphrodite.** In mythology, goddess of love and of the fruitfulness of nature. Her Roman counterpart was Venus. According to some she was a daughter of Zeus, according to others she rose from the foam of the sea, near Cyprus; hence the name Aphrodite (Gr. *aphros*, sea-foam).

Aphrodite's husband was Hephaistos (Vulcan), but she had amours with Ares, Hermes, Dionysus, and Poseidon among



Aphrodite. Bronze head from an ancient colossal statue  
British Museum

the gods, and with Adonis and Anchises among mortals. From her connexion with Ares she is also somewhat curiously regarded as a goddess of war, who takes special interest in arms and armour. By Ares she was the mother of Eros or Cupid. During the Trojan War she favoured the cause of the Trojans and constituted herself the guardian of Paris and Aeneas.

The worship of Aphrodite appears to have been of Eastern origin, introduced by the Phoenicians. It was widely diffused, its chief seats being Cyprus and Cytherea, and was frequently marked by sexual excess. Her girdle or zone was supposed to possess miraculous power to excite the passions of love; the sparrow and the dove were sacred to her, and among plants the rose and the myrtle.

**Apia.** Chief town and seaport of Western Samoa, New Zealand trust territory, on the N. coast of Upolu. It exports copra. R. L. Stevenson lived here during 1889-94. Pop. (1951) 11,840.



Apis, the sacred bull. Figure in relief found in the tomb of Ephto Stopte at Sakkara

In 1889, when Germany, the U.K., and the U.S.A. were all seeking to "protect" Samoa, three U.S. and three German ships and the British ship *Calliope* were gathered in Apia harbour. A hurricane developed on March 15, and by the next evening only the *Calliope* remained afloat; by her superior power and by fine seamanship, she had managed to put out to sea. This disaster led to a temporary easing of international friction, and the three countries set up a joint protectorate.

**Apicius, MARCUS GAVIUS.** Roman epicure. He lived under the Emperor Tiberius, 1st century A.D., and apparently spent the whole of his time and fortune in inventing and eating new and tasty dishes. Then, his money gone, he hanged himself. He is mentioned by Seneca. A book on cooking, *De Re Coquinaria*, once attributed to him, is of much later date.

**Apis.** Genus of insects of the order Hymenoptera. There are four species, commonly called honey bees. See Bee.

**Apis.** Sacred bull worshipped at Memphis throughout dynastic Egypt. He bore a white forehead mark upon a black hide. At death he became, like human souls, one with Osiris, and his embalmed remains were enshrined in a huge costly sarcophagus. The Sakkara mausoleum still contains twenty-four of these Apis-tombs.

**Aplanatic Lens** OR APLANAT. Lens corrected for both spherical aberration and coma. Some correction is possible with lenses manufactured in quantity and therefore have spherical surfaces. More detailed correction requires figuring to an aspherical shape of some kind, and can be carried out only with individually produced instruments such as high grade microscopes and telescopes.



Apia, Samoa. Government House, once the home of Robert Louis Stevenson

**Apnoea** (Gr. *a*, not; *pnein*, to breathe). Temporary cessation of breathing produced by breathing more rapidly than physiological requirements demand.

**Apocalypse** (Greek, unveiling). Name given to a particular type of religious literature very popular in later Judaism and early Christianity. Of it the Book of Revelation which closes the New Testament is the best known example. Apocalyptic—the word used to denote the faith embodied in the different Apocalypses—was the lineal descendant of Hebrew prophecy, but differed from it in that its whole outlook was turned to the future. The dream of national greatness, which is one of the special themes in prophetic literature, had faded away under the disasters and defeats which the Jewish people sustained from the successive empires that attained world domination. The faith of Israel sought comfort in the thought that the way of deliverance would be found in “the day of the Lord,” when God would break into human history and set up His Kingdom by a *tour de force*.

Apocalyptic can best be understood by contrasting the Greek and Jewish conceptions of Utopia. In Greek thought, especially in Plato, Utopia is to be realized by the natural evolution of social forces. To the Jews, on the other hand, the realization of Utopia was only possible through a divine intervention. Apocalyptic first took shape in the writings of Ezekiel, and found its fullest expression, as far as the Old Testament is concerned, in the Book of Daniel. In the subsequent period between 170 B.C. and A.D. 100 many Jewish Apocalypses were written, e.g. The Book of Enoch, which contains a number of Apocalypses of varying dates, The Book of the Secrets of Enoch, The Apocalypse of Baruch, The Ascension of Isaiah, The Assumption of Moses, and The Fourth Book of Ezra. The Book of Revelation represents an attempt to Christianise the Apocalyptic movement. Other attempts of a similar nature were also made, e.g. The Apocalypse of Peter, fragments of which were discovered in 1884. This was the source from which Dante derived much of his imagery for the Paradiso and Inferno.

**Apocalyptic Number.** The number 666, given as that of the Beast in Rev. 13, 18. It was applied by the early Christians to rulers who seemed like Antichrist such as Caligula and Nero, the letters of whose names, written in Hebrew, total 666. Alternatively

it stood for the Roman empire. Throughout history ingenious people have fitted the number to the names of their enemies.

**Apocatastasis.** Greek word meaning restoration to its first condition. It is applied to the theological doctrine that all mankind shall ultimately enjoy salvation, and that even devils and those accounted lost, having been created by God, shall return to God. Derived from Platonism, it was taught by Origen, Clement of Alexandria, and S. Gregory of Nyssa. It was attacked by S. Augustine and condemned at the Council of Constantinople, A.D. 553. The belief, as revived by various modern sects, is known as Universalism. See Universalists.

**Apocrypha** (Greek *apokryphos*, secret). A term applied first to writings which were kept secret because they were supposed to contain truths which might be imparted only to the duly initiated. Apocryphal then came to denote certain writings connected with, and growing out of, the Old and New Testaments, but of a different character from the books generally accepted as inspired or canonical. From this to the meaning spurious or heretical the transition was easy. In common speech the Apocrypha denotes the Old Testament Apocrypha.

The Apocrypha Proper are included in the Greek (Septuagint) and Latin (Vulgate) Versions, but not in the Hebrew or English Bible. The Church of Rome at the Council of Trent (1546) accepted them as “sacred and canonical.” The Protestant Churches rejected them, but some of the Reformed Churches, e.g. the Church of England, use them for purposes of edification.

The books, which are in some cases Palestinian and in others Hellenistic, may be classified thus: (a) *Additions to the Old Testament*: the remainder of the Book of Esther, the Prayer of Manasseh, three additions to Daniel, viz. The Song of the Three Holy Children, The History of Susanna, and the Story of Bel and the Dragon. These are of the nature of legendary history or romance. (b) *Historical Works*: I Esdras, I and II Maccabees. (c) *Didactic Works*: The Wisdom of Solomon, the Book of Sirach (Ecclesiasticus). (d) *Religious Romances*: The Book of Tobit, the Book of Judith. (e) *Apocalyptic Works*: The Book of Baruch, II Esdras. There also exist a Third Book of Maccabees (in Septuagint, but not in Vulgate) and a Fourth Book of Maccabees (in Alexandrian MS. of Septuagint, but not in Vulgate). These are

romantic in character. The periods to which these works may be assigned are as follows: c. 200–100 B.C., Sirach, Tobit, Judith, Additions to Daniel; c. 100–1 B.C., I Maccabees, II Maccabees, III Maccabees, Book of Wisdom, I Esdras, Additions to Esther; c. A.D. 1–100, Baruch, II Esdras.

The Pseudepigrapha are a similar body of literature so described by scholars because many of them were written in the names of famous persons. This class of writing has been characterised as Apocalyptic Literature. The style of writing is prophetic and allegorical or symbolic. (See Apocalypse.)

The Apocrypha connected with the New Testament are not so well known. Nor are they so well defined as a collection of writings. Most of them are very fantastic. But there are some (the First Epistle of Clement, the Teaching of the Twelve Apostles or the Didachē, the Epistle of Barnabas, the Shepherd of Hermas, the Gospel and the Apocalypse of Peter) which resemble more closely New Testament writings, and in fact were used for a time as Scripture by the Church; and there are others of such value (the fragmentary Gospel according to the Hebrews and Gospel according to Peter; the Logia or Sayings of Jesus) that they may be used to supplement the Gospel account of the life of Jesus.

The First Epistle of Clement was written (probably A.D. 95–6) to the Church at Corinth in the name of the Church of Rome, and was evoked by “an unholy and detestable sedition” in the Corinthian Church. It inculcates the virtues of unity and charity. The Teaching of the Apostles deals with (1) the general moral teaching of the early Church, and (2) the institutions of the Church. It has been dated as early as A.D. 70 or 80, but may be much later. The Epistle of Barnabas, described by Origen as the “Catholic Epistle of Barnabas,” is even included among N.T. books in the Sinaitic MS. The Epistle seems to be addressed to the Church as a whole. It deals with the attitude to be adopted towards the Jewish Law, which is interpreted allegorically. It can hardly have been written by the Apostle Barnabas, and may perhaps have originated about A.D. 130.

The Shepherd of Hermas is another work included in the Sinaitic MS. It contains visions, commandments, and parables, and has been called the “Pilgrim’s Progress” of the early Church. In its present form it may have originated about A.D. 140. The



Gospel according to the Hebrews contains some interesting sayings. Harnack would assign it to a date between A.D. 65 and 100. The Gospel according to Peter is heretical, written to promote Docetism, which taught that the humanity of Christ was not real, but only apparent. It is assigned by Harnack to a date between A.D. 110 and 130, but it may be later. In recent years a number of papyri containing Logia or Sayings of Jesus have come to light. Some may be genuine.

The more legendary Apocrypha include Gospels (such as the Protevangelium of James, the Gospel of the Nativity of Mary, the History of Joseph the Carpenter, the Gospel of Thomas, the Gospel of Nicodemus); Acts (of Paul and Thecla, of Thomas); Epistles (such as the correspondence between Jesus and Abgarus, the Epistle of Paul to the Laodiceans); and Apocalypses (of Paul, of Peter).

**Apocynaceae** (Gr. *apo*, from: *kyōn*, dog). Extensive family of twining shrubs, and a few herbs. They are natives of tropical and temperate regions in both hemispheres. Their milky sap is usually poisonous or violently purgative. The leaves are opposite or in whorls; the flowers salver-shaped or bell-shaped. The five lobes of the corolla are oblique. The family comprises more than 180 genera and 900 species, including the well-known periwinkle (*Vinca*), oleander (*Nerium*), and dogbane (*Apocynum*).

**Apodeictic** (Gr. *apodeiktikos*, demonstrative). Name given by Aristotle to a proposition which is demonstrated by incontestable evidence. Kant applied the term somewhat differently, to a judgment which is necessary and universal, not the result of experience. See Logic.

**Apogee** (Greek *apo*, from; *gē*, earth). Astronomical term with two meanings. (1) Point in the moon's orbit farthest from the earth. (2) Position in which the sun, or any other body in the solar system, is farthest from the earth.

**Apollinaire, GUILLAUME** (1880-1918). French poet. He was the founder of cubist poetry, a reaction against symbolism and romanticism. Alcools (1913) recorded in kaleidoscopic series his subjective impressions of the twentieth-century world. In Calligrammes (1918) he experimented in a freer selection and arrangement of words, and even in their setting, e.g. a poem on rain was printed in the form of a

downpour. He died a victim of the influenza epidemic of 1918. His work was later acclaimed by the surrealists. Consult G. Apollinaire: *Choix de Poésies*, 1945.

**Apollinarianism.** A heresy originating with Apollinarius, bishop of Laodicea, in the 4th century A.D. Starting with the Platonic assumption that man includes a human body (Gr. *sōma*), a human or rational soul (*psychē*), and a human mind (*nous*), it taught that in the human nature of Christ the



Apollo. Ancient marble statue of the Greek god  
Vatican, Rome

divine Word (Gr. *Logos*) took the place of the *nous*. It contended that to assume the complete humanity of Christ was to assume in His nature the possibility of sin and so to negative the Atonement. The heresy was condemned by the general Council of Constantinople, 381.

**Apollinaris.** Mineral spring of North Rhine-Westphalia, Germany. In the Ahr valley, 10 m. by rly. N.W. of Remagen, its waters are alkaline and contain carbonate

of soda. They are beneficial in cases of diabetes. Discovered in 1851, the spring waters average a temperature of 94° F. This and other springs in Germany and Hungary are owned by a British company, which bottles the waters and sends them nearly all over the world. The supply was interrupted by each of the Great Wars.

**Apollinarius** OR APOLLINARIS (d. c. A.D. 392). Founder of the Apollinarian heresy. Son of an Alexandrian rhetorician and a friend of Athanasius, he transformed the Gospels and canonical Epistles into dialogues in imitation of Plato, defended Christianity against Porphyry, and strenuously opposed Arianism. In 362 he was made bishop of Laodicea in Syria. His opposition to Arianism, which denied the complete divinity of Christ, led him, in effect, to deny the complete humanity of Christ, hence the heresy Apollinarianism.

**Apollo.** One of the greater deities of ancient Greece. The son of Zeus and Leto (Latona), he was born in Delos, Artemis being his twin sister. In Homer Apollo is not identified with the sun, but in later mythology becomes the sun god. From the earliest times, however, he is the god of disease who sends pestilences among men, and is also the healing god. Power to foretell the future was attributed to Apollo in an eminent degree. There were many oracular shrines or temples of Apollo, notably the famous oracle at Delphi (q.v.). Probably for his gift of prophecy he was the patron deity of states, and especially of colonies, no colony being founded except after consultation with the oracle. Apollo is always represented as a tall, handsome, beardless youth, holding in his hand a bow or lyre. As the supreme type of manly beauty, he was the patron deity of athletes. He was also worshipped at Rome.

**Apollo Belvedere.** Statue of Apollo discovered c. 1500 in the ruins of Porto d'Anzio, the ancient Antium. It was acquired by Pope Julius II, who placed it in the Belvedere gallery of the Vatican. It lacked the left hand and right forearm, both of which were restored by Giovanni Angelo Montorsoli (1507-63). The statue is supposed to be a 1st-century A.D. copy of the bronze original. (Illus. in p. 495.)

**Apollo Club.** Society founded by Ben Jonson about 1616 at the Devil Tavern, No. 2, Fleet Street, London. This famous inn was pulled down for the enlargement of Child's Bank in 1788. At the club's



Apollo Belvedere, supposed to have been sculptured nearly two thousand years ago. See page 494

Vatican, Rome

lyric feasts there foregathered the wits of the day. A bust of Apollo and a board with the poetic Welcome are preserved at the bank. The rules. *Leges convivales*, written in Latin by Jonson, bade the durlard, the ass, the sad-faced, and the lewd fellow keep away, and provided that "choice women" should not be excluded.

**Apollo Theatre.** Situated in Shaftesbury Avenue, London, this playhouse was opened Feb. 21, 1901, under the management of Henry Lowenfeld, with *The Belle of Bohemia*. Some of the greatest successes on the London stage were presented at the Apollo, including Pélissier's *Follies*, 1908; General John Regan, 1913; Hobson's *Choice*, 1916; *Idiot's Delight*, 1938.

**Apollodorus** (fl. c. 140 B.C.). Greek grammarian. He was a pupil of Aristarchus and the Stoic Panaetius. All his works have perished except his *Bibliotheca*, a well-arranged collection of stories connected with the mythical and heroic ages of Greece.

**Apollonia.** The name of numerous ancient cities. One in Illyria, near the mouth of the river Aous, was founded by emigrants from Corinth and Corcyra. Later it became a flourishing commercial town and the seat of a university at which Maecenas and the young Octavius were educated. Another, founded in Thrace by the Mile-

sians, was famed for its temple and its statue of Apollo by Calamis; this was removed to Rome by the art-patron Lucullus. Thracian Apollonia was afterwards called Sozopolis, which was later corrupted to Sozeboli.

**Apollonia.** Town of Libya. It lies on the coast 45 m. W. of Derna, and is the port of Cyrene. Like many other places in Libya, it was several times captured and lost by British and Axis forces during the fighting in North Africa, 1941-42, in the Second Great War. See North Africa Campaigns.

**Apollonius OF PERGA** (c. 265-200 B.C.). Greek mathematician. He studied in Alexandria and returned there after a brief period at Pergamum. His great study of conic sections, which carried forward

and developed the work of Euclid, earned him the title of the Great Geometer. He introduced the names ellipse, hyperbola, and parabola, and obtained most of the properties of conics found in modern textbooks by synthetic (*i.e.* non-analytical) techniques.

**Apollonius OF RHODES** (c. 295-215 B.C.). Greek epic poet and grammarian. He was born at Alexandria, and was a pupil of Callimachus. Afterwards an enmity sprang up between the two poets, and when Apollonius read his *Argonautica* in public he found it coldly received owing to the intrigues of his rival. He then went to Rhodes, where the people received a revised version with great applause and bestowed upon him the rights of citizenship. Back in Alexandria he acquired great fame and popularity, and was appointed chief librarian by Ptolemy Euergetes. In his epic, which describes the voyage of the Argonauts in quest of the Golden Fleece, he strives to imitate the style of Homer. The poem was translated into Latin by Valerius Flaccus and Varro Atacinus.

**Apollonius OF TRALLES** (2nd century B.C.). Greek sculptor. He is notable as having executed, with the aid of his brother Tauriscus, the colossal marble group of Amphiion and Zethus, known as the Farnese Bull. This group, in the National Museum, Naples, is

reputed to have been in Rome about the time of Pliny.

**Apollonius OF TYANA** (c. 4 B.C.-A.D. 97). Greek Pythagorean philosopher. He was born at Tyana in Cappadocia, and travelled widely. In Rome he was accused of high treason against Domitian, but suddenly disappeared during his trial. He died at Ephesus while head of a Pythagorean school. Apollonius was looked upon as a magician, and wonderful tales are told of him in the story of his life by the sophist Philostratus, written in the 3rd century. His life and reputed miracles were compared with those of Christ.

**Apollo.** Name of an early convert to Christianity mentioned in the N.T. He was a Jew of Alexandria converted to Christianity by Aquila and Priscilla at Ephesus. Later, at Corinth, he preached the Gospel of Christ, and is mentioned by S. Paul as a fellow-worker whom faction had endeavoured to make a rival. *Consult Acts 18: 1 Cor. 1, 3, and 4.*

**Apollyon.** Greek term in the N.T. for the Hebrew Abaddon. It means the Destroyer (Rev. 9), and is so applied to the Devil by Bunyan in *The Pilgrim's Progress*.

**Apologetics.** That department of Christian theology which is entrusted with the defence of the Christian religion. Alike in theory and practice there has been infinite diversity in apologetic method, varied more in its forms than has the intellectual and literary crusade on behalf of the Christian faith. The latter has been from the start the subject of passionate contention. Not peace but a sword was the Founder's own metaphorical description of the purpose and result of His coming. He invited resistance and entailed upon His followers a legacy of struggle. An undercurrent of apologetic purpose runs through the N.T. not seldom rising to the surface. Apart from differences between leaders and parties in the swiftly growing church, missionary enterprise brought into the open the latent principles of external opposition, and by literature not less than preaching the resources of the new faith were developed.

The apologetic energies of Christianity have often resulted in the purifying of Christian faith, discipline, and practice. Dogma and piety are both indebted to the vision and experience gained by apologists through their warfare. Such questions as: What is the essence of our religion? What must be conserved at any



cost? What compromises would be disastrous? help to illuminate the path of constructive doctrine and of practical life.

In the first age Jewish, Greek, and Roman polemics were met by Clement of Alexandria, Tertullian, Origen, and Augustine. In the Middle Ages Judaism, Islam, and free-thinking philosophy were dealt with by Abélard and Aquinas. During and after the Reformation Islam and free-thought had still to be combated, as by Pascal. In the 18th century deism and scientific scepticism were met by Butler. In the 19th century attacks came on a far more comprehensive scale, but in Britain were defended by James Martineau, Robert Flint, A. M. Fairbairn, and J. R. Illingworth, who carried the war into the very strongholds of antagonistic thought.

As the result of modern apologetic activity, a revolution has been effected in our conception of religious values. Alternatives to the Christian system have been faced. The spread of education, the diffusion of literature, missionary enterprise, the encroachment of secular interests, have helped to bring about an increase in the sense of Christian and indeed religious solidarity, a weakening of sectarian animus, a growth of the power to visualise the issues raised. The battle for religion has drawn out into the open every form of spiritual activity; atheism, agnosticism, and materialism stand out as a common menace to the faiths. Apologetics accordingly has refused to hazard all upon the historicity of particular miracles, upon the inerrancy of particular Scriptures, upon an absolute differentiation between the natural and the revealed, the natural and the supernatural, the human and the Divine. Stress is laid upon continuity of faith in the unseen. Christianity is viewed as a system or ideal of life, involving the doctrine revealed by Christ but equally the life disclosed by Him and developed by His Spirit. Truth is recognized and even welcomed in rival religions. In the life and teaching of Jesus a self-commending ideal of life and thought is found, supreme in grandeur and simplicity, universal and final. See Christianity.

**Apologia pro Vita Sua** (Lat. Apology for his own life). Work by John Henry (afterwards Cardinal) Newman, first published in 1864. The work, provoked by a statement of Kingsley's challenging

Newman's regard for truth, is the best example of the author's prose. In it he traced the way in which he passed from the Anglican to the Roman Catholic Church, and told much of the story of the Oxford Movement (*q.v.*). While the statement that provoked the work has been relatively forgotten, the *Apologia* remains one of the permanently valuable autobiographies of the world.

**Apology** (Gr. *apologia* defence). In law, an expression of regret for an offence. In an action for defamation, an apology will usually result in reduction of the damages. Under the Libel Acts, 1843 and 1845, newspapers were enabled in certain cases to pay money into court and to apologise but could not rely on any other defence. A defendant may now in every case pay money into court so that the Libel Acts are rarely invoked. A new power of apology, valuable particularly to authors, printers, and publishers, was introduced by the Defamation Act, 1952, where unintentional defamation has occurred. Unintentional defamation arises (1) where the words are not defamatory on the face of them and the person publishing did not know of the special circumstances making them defamatory—*e.g.* a statement that A is engaged to marry B which, if A (or B) is already married to someone else, may be defamatory of his (or her) spouse, because the words may mean that they are not in fact married; (2) where the words are clearly defamatory, but the person publishing them did not know they could refer to the person complaining—*e.g.* where a character in a novel is described in such a way that readers think that a real person is referred to. It must also be shown that the publisher exercised all reasonable care and that the author acted without malice. If a person sued for unintentional defamation offers to publish an adequate apology, then the person complaining loses the right to claim damages.

In literature the word is used to mean rather a plea for a person or thing. In this sense it was used by Plato in his apology for Socrates at his trial; by Sir Philip Sidney in his *Apologie for Poetrie*, c. 1581; by Thomas Heywood in his *Apology for Actors*, 1612; and by other writers.

**Apophthegm** (Gr. *apo*, forth, *phthengesthai*, to speak). A terse, sententious expression of philosophic thought, *e.g.* Cowards die many

times before their deaths; the valiant never taste of death but once. *Pron.* App'-ōth-em.

**Apoplexy** (Greek *apo*, from: *plēssein*, to strike). Condition of sudden loss of consciousness and sensation due most frequently to the bursting of a blood-vessel in the brain. It is often referred to as an apoplectic stroke. Apoplexy is commoner in men than in women, and occurs often after the fiftieth year of life. Syphilis, alcoholism, and heavy muscular work are predisposing factors. The attack is usually without previous warning symptoms, and occurs while the patient is engaged in his ordinary occupations, though sometimes it is precipitated by extra exertion.

In a typical attack there is deep unconsciousness and the patient may fall heavily to the ground; the face may be flushed or pale or bluish; the pupils may be unequal; often the head and eyes are turned towards the damaged side of the brain. The breathing is noisy and laboured, the cheeks being puffed out during expiration and frothy saliva collecting about the mouth. The pulse is full and tense and often slow. In some cases the onset is less abrupt. In moderate attacks consciousness gradually returns, but in severe forms the condition may persist and end in death in a few hours.

Paralysis is a frequent result of an apoplectic stroke. Sometimes the whole of one side of the body is involved, a condition known as hemiplegia; in other cases only the face, arm, or leg of one side is affected. Impairment of speech with various forms of aphasia is common. With the passage of time considerable power of movement may be regained in the paralysed muscles, but complete recovery, except in mild cases, is rare.

The treatment during an attack is to keep the patient absolutely at rest with the head slightly raised. Hot bottles may be placed at the feet and an ice-bag applied to the head. In some cases venesection or blood-letting has been useful, but little can be done to relieve the paralysis. A person who has once had an attack should lead an ordered restful life, avoiding alcohol, over-eating, and severe muscular effort.

**Aposiopesis** (Gr. *aposiopaein*, to become silent). A rhetorical figure in which a speaker breaks off in the middle of what he is saying, impressing the imagination of the hearer by what is left unexpressed. It is often used to convey a threat.

**Apostasy** (Greek *apo*, away; *stasis*, standing). Term originally meaning the desertion of a military post. Its later and general application is to the complete and voluntary renunciation of the Christian faith, either in favour of another religion or of none. The persecution of the 3rd century under the Roman Empire induced a considerable apostasy, and in the Middle Ages in Spain many abandoned Christianity to become Jews and Mahomedans. The apostate always incurred heavy ecclesiastical penalties. The rejection of Christianity in favour of paganism by the emperor Julian is a most remarkable instance of apostasy.

**Apostle** (Gr. *apo*, from; *stellein*, to send). Term meaning "one sent forth," and so a commissioned delegate or messenger. The name is applied specially to the twelve followers selected by Jesus to be His close and constant companions and to carry on His work after His departure (cf. Matt. xxviii, 16-20). These were Simon, also called Peter; Andrew; James and John the sons of Zebedee; Philip, Bartholomew, Thomas, Matthew; James the son of Alphaeus; Thaddaeus; Simon the Cananaean or Zealot; and Judas Iscariot (Matt. x, 2-4; cf. Mark iii, 16-19; Luke vi, 14-16; Acts i, 13). Later Jesus appointed seventy others and commissioned them (Luke x, 1). These He sent forth "two and two before his face into every city and place whither he himself was about to come." According to tradition, one of them was Barnabas; and according to Origen, Andronicus and Junias may have been included in the number. In any case the title was extended for one reason or another to Barnabas (Acts xiv, 4, 14; 1 Cor. ix, 5-6). Paul applied the title to himself, and claimed by virtue of a direct revelation from Christ to himself to rank with the chosen apostles (Gal. i, 1, ii, 8; 1 Cor. i, 17, xv, 8-10, etc.). There were others, false teachers, who assumed the name to further their own ends (2 Cor. xi, 5, 13; Rev. ii, 2). In later times the term apostle has been applied to missionary founders of the Christian Church in various lands. e.g. S. Augustine, apostle of the English, S. Patrick of the Irish, and S. Boniface, the apostle of Germany. See Christianity.

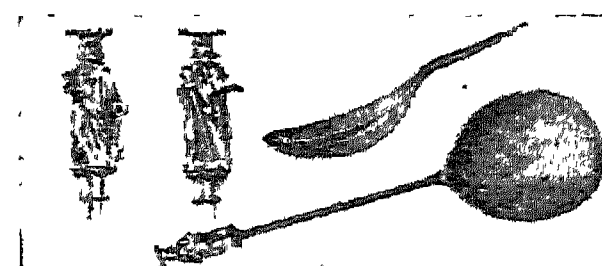
**Apostle Islands.** Group of 27 isles in Lake Superior, belonging to Wisconsin, U.S.A. They produce valuable timber, possess brown sandstone quarries, and contain several Jesuit mission stations and an Indian reservation. The area is about 200 sq. m.

**Apostles, THE.** Oratorio by Sir Edward Elgar. Shortly after his completion of *The Dream of Gerontius* (q.v.) the composer planned a sequence of three oratorios to be based on the lives and works of the apostles. This trilogy was never completed. The first section, known as *The Apostles*, Parts 1 and 2, was performed under the direction of Richter on Oct. 14, 1903, at the Birmingham Festival. The words Parts 1 and 2 were omitted from later editions because the next section was separately entitled *The Kingdom* (q.v.). The text of *The Apostles* is taken from the Bible; the narrative follows the N.T. story from the beginning of Christ's ministry to His death, resurrection, and ascension.

**Apostles' Creed** (Latin *credo*, I believe). Confession of the Christian faith, stating in short articles the fundamental doctrines of Christianity. The earliest form of this creed was a profession of faith in the Holy Trinity required at baptism. In the 2nd century Irenaeus and Tertullian quoted a number of items set out in the old Roman creed; later testimony comes from Hilary, S. Augustine, and Leo the Great, and by the 7th century the Apostles' Creed in its present form was in use at Rome and in southern Gaul. The additions to the old Roman creed are Creator of heaven and earth, He descended into hell, the communion of saints, life everlasting, and the word Catholic—Holy Catholic Church superseding Holy Church.

The Apostles' Creed has been continuously retained in the baptismal service of the Catholic Church since the 7th century, and is part of the order of baptism in the Roman ritual and of the baptismal service of the Book of Common Prayer. It is also recited daily in the morning and evening offices of the Roman Breviary and the Anglican Prayer Book. The Council of Trent endorsed its authority as an essential statement of Catholic belief, and it is required to be believed in the Church of England. The tradition of the Middle Ages, dating from the 5th century, that the twelve Apostles drew up a creed and that this creed was that taught by the Fathers, is without historical foundation. The title Apostles' Creed is so given because the belief expressed is the faith of united Christendom from the days of the Apostles. Consult *Apostles' Creed*, H. B. Swete, 3rd ed., 1899; *The Apostles' Creed*, A. C. MacGiffert, 1902; *The History of the Creeds*, F. J. Badcock, 2nd ed., 1938.

**Apostle Spoon.** Spoon bearing on it the figure of an apostle. Such spoons were usually made in sets of thirteen, each handle terminating in the figure of an apostle except the thirteenth, which bore the figure of Christ. In the 16th century, when a child was baptized the custom was to give it one of these spoons bearing the figure



Apostle Spoon. Examples of the only known complete set, 1626

Goldsmiths' Company, London

of the child's patron saint. Old specimens are very valuable.

**Apostoles.** Town of Argentina, in Misiones Territory. It is on the North-Eastern Rly., 35 m. S. of its terminus at Posadas. Founded in 1638 by Jesuit missionaries, in a fertile region, it has interesting architectural remains. Apostoles is the chief town of a dept. of the same name.

**Apostolic Acts.** Works or Acts in the N.T. Apocrypha, professing to give further details concerning the lives and histories of the Apostles. Their apocryphal character is indicated by the extravagance of their narratives as compared with the general simplicity of the N.T. records. Some of the Acts are the product of a pious fantasy; others were composed in the interest of some heresy. Among the earlier of these writings are the *Acta Andreae* (Acts of Andrew), the *Acta Thomae* (Acts of Thomas), and the *Acta Joannis* (Acts of John). The last-named was popular among the Manicheans and certain Gnostics. There are also Acts of Peter and Paul, of Paul and Thecla, of Barnabas, of Philip, of Thaddaeus, and of others. See Apocrypha.

**Apostolic Brethren.** Name applied to a sect that arose in Syria and Asia Minor in the 2nd century. They denounced flesh-eating, private property, and marriage, on the ground that these things were a departure from apostolic custom. They became identified with the Manicheans. Societies bearing the name of Apostolici, and reviving the teaching of the earlier Apostolic Brethren, arose in the 12th and 13th centuries in Germany and Italy.

**Apostolic Constitutions.** Collection of eight books, laying down rules for the conduct of Christians, the order of services, the administration of the Sacraments, and the authority of the clergy. Ascribed



by the compilers to a Clement of Rome, they probably date from the latter half of the 3rd or the early part of the 4th century. The first six books are derived from the Didascalia of the Apostles, a lost treatise of the 3rd century, found in Syriac versions, while the seventh book is based on the Didachē of the Twelve Apostles, a 2nd century work rediscovered in 1873. The eighth book can be traced to a number of sources. The apostolic constitutions were unknown in the Western Church in the Middle Ages and were published in 1563 for the first time in Latin and Greek.

**Apostolic Fathers.** The name used to distinguish those disciples and contemporaries of the Apostles who wrote in the cause of Christianity. They include Clement, bishop of Rome, believed to be the Clemens referred to by S. Paul (Phil. 4), to whom two epistles are ascribed, only one of which is his; Ignatius, bishop of Antioch, seven of the twelve epistles attributed to whom are regarded as genuine; Polycarp, bishop of Smyrna, author of an epistle to the Philipians; Hermas, to whom the work known as The Shepherd of Hermas is doubtfully assigned; Barnabas, whose name is given to an anti-Jewish epistle thought to have been written by a converted Alexandrian Jew, not the companion of S. Paul; and Papias, a contemporary of Polycarp and Ignatius, whose writings exist in fragments.

**Apostolic Majesty.** The title borne by the emperors of Austria in their capacity as kings of Hungary. Pope Sylvester II gave it to S. Stephen, the first Christian king of that country, about 1000, and Clement XIII confirmed it when the empress Maria Theresa was "king" of Hungary. It lapsed with other royal titles in 1918.

**Apostolic Succession.** Name for the doctrine that the mission given to the Apostles by Christ (John 20; Matt. 27) must extend to their legitimate successors in an unbroken line until the end of the world. The Roman Catholic interpretation of this doctrine (held also by the High Anglican school) is that the method of preserving the succession and thereby preserving the Apostolic faith is through the episcopate alone; the Apostles having laid their hands on their successors, who in turn ordained other bishops. It thus follows that only those clergy ordained by bishops of the succession have the Apostolic power, the authority to celebrate the Eucharist and to give absolution to the penitent.

Most Protestant Nonconformists, on the other hand, maintain not only that the succession does not depend on episcopal ordination, but that such a succession does not exist, the Apostolic faith having been preserved by the written word of the N.T. and legitimate successors to the Apostolic ministry raised up from time to time as S. Paul was. While Apostolic succession is to Roman Catholics, and to many members of the Church of England, a guarantee of the validity of their sacraments and the assurance of a duly commissioned ministry, neither such guarantee nor assurance is of recognized importance to Protestant Nonconformists. See Anglicanism; Roman Catholic Church.

**Apostrophe** (Greek *apo*, from *strophē*, turning). A rhetorical figure. If a speaker interrupts his general discourse to address a particular individual, or sometimes a person or personification as though present, this is called an apostrophe. In the former sense Jesus apostrophised Peter (Luke 22); in the latter sense the figure is frequently employed in poetry and in impassioned prose. Thus, in Scott's Marmion (canto vi), the story is interrupted by the apostrophic "O woman, in our hours of ease."

In punctuation, an apostrophe is the mark ', used to denote the omission of a letter or figure; e.g. o'er for over, '46 for the year 1946. It is obligatory for showing the possessive case, as in the boy's, or several boys' (except in the word its): here the omission was originally of the letter e. A minor use is in forming the plural of a letter or figure, e.g. P's and Q's, all the 8's, though this is not accepted as sound by all authorities. There are still variations in practice, for whereas most would write can't for cannot, Lewis Carroll used ca'n't, and Bernard Shaw used cant, likewise Im and theyre. In printed prose there is little excuse for can't and its like, except in quoted speech or in making use of such established phrases as "It's an ill wind," etc. The apostrophe is valuable in poetry for showing scansion; thus, winged might be two syllables, but wing'd must be one.

**Apothecaries** OF LONDON, WORSHIPFUL SOCIETY OF. Corporation in London, which has power to license medical practitioners and dispensers. Its charter dates from 1617, before which it was united with the Grocers' Company. Its early duties were to examine and license assistants to apothecaries,

but since 1815 it has also conducted examinations for intending medical men, who could then



Apothecaries' arms

practise in England and Wales. By the Medical Act, 1858, it can appoint a member on the General Medical Council and confer the degree of licentiate. Under the Apothecaries Act, 1907, it grants the diploma of licentiate in medicine and surgery—L.M.S.S.A. (London). The society is a city livery company. Consult The London Apothecaries, Their Society and Their Hall. C. Wall, 1932.

**Apothecaries' Hall.** In Black Friars Lane, Queen Victoria Street, London, E.C.4. It was rebuilt in 1678 after the Fire of London. The monthly examinations of candidates seeking the licence, L.M.S.S.A., are held here. The premises consist of a great hall, court room, and library, panelled in oak of the Wren period. There is some interesting stained glass, and a fine collection of furniture, plate, and pictures, the latter including two portraits of James I, founder of the Society of Apothecaries. The minutes are complete from 1617, and the library contains many ancient herbals and other valuable books. Laboratories were attached to the hall in 1671.

**Apothecaries' Measure and Weight.** Used in prescribing and dispensing medicines. Solids are weighed, and liquids are measured. The units are the grain, scruple, drachm, ounce, and pound for weights, though the custom is to use only the first three for prescribing; quantities of solids above the drachm are presumed to be weighed by avoirdupois weight. In apothecaries' weight a pound consists of 12 oz. of 480 grains; whereas the avoirdupois pound is equivalent to 16 oz. of 437½ grains. The units in apothecaries' measure are the minim, fluid drachm, fluid ounce, pint, and gallon. In prescribing liquids, quantities up to an ounce are measured by the apothecaries' scale; for larger quantities, imperial measure is used. After 1953 some British manufacturing chemists adopted the metric system.

**Apothecary** (Greek *apothēkē*, store). One who mixes drugs. The art of mixing and prescribing drugs is ancient, and those who practised it were recognized as a distinct class from the 12th century. At

first they were associated in London with traders with the East in spices and drugs, known as pepperers and spicers of Cheap (Cheapside). Later they became incorporated with the grocers, but retained their special title and practised as apothecaries.

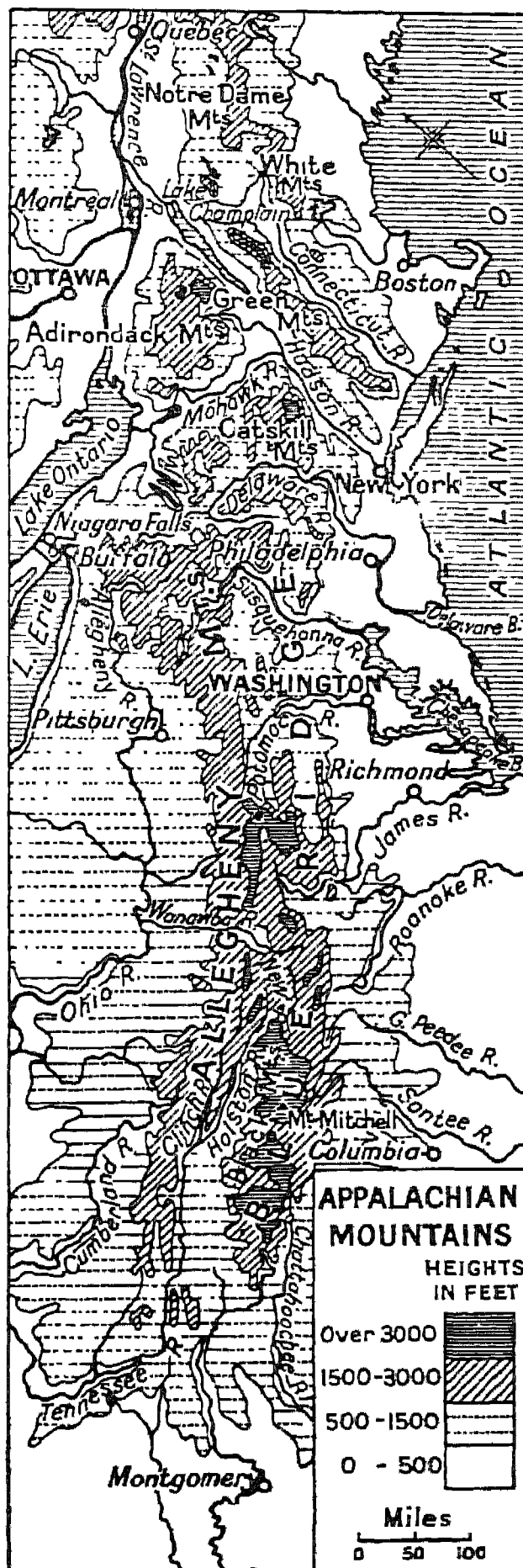
**Apotheosis** (Gr. *apo*, apart; *theos*, god). Elevation of human beings to the rank of gods. The practice existed among many ancient peoples—Egyptians, Assyrians, Greeks, and Romans, Incas and Aztecs. Among the Greeks its earliest form was the semi-deification as heroes of distinguished warriors and founders of colonies. After the 5th century B.C. full divine honours came to be bestowed upon rulers and generals even during their lifetime. In memory of Julius Caesar, divine honours were decreed him after his death with the title of *divus*. After this it became the usual custom for the ruling emperor to propose to the senate that his predecessor should be deified, a ceremony called *consecratio*. Emperresses also were sometimes allowed to share the honour.

**Appalachians.** Mountain system of North America. It stretches N.E. to S.W. in a series of parallel ridges and valleys from Quebec province, near the St. Lawrence, to the Gulf Coast plain in central Alabama, and, with the exception of the Adirondacks, includes all the major mountain ranges E. of the Mississippi. In general it consists of an eastern and a western ridge, with a trough between. On the E., rising from the coastal plains, are the older Appalachians, consisting of the Canadian Acadian uplands, including the Shickshock and Notre Dame Mts.; the New England uplands, including the White Mts. and Green Mts.; and the Blue Ridge, extending from Pennsylvania, through Maryland, Virginia, Carolina, and Georgia, into Alabama. The highest point is Mt. Mitchell, 6,711 ft., in the Black Mts., which are part of the Blue Ridge. Mt. Washington, 6,290 ft., in the White Mts., is the highest point in the N.

Dividing the Blue Ridge from the newer western plateau is the Great Appalachian valley, extending from the Mohawk river through a series of longitudinal valleys—among which that of the Shenandoah is famous for its beauty—to the Gulf Coast plain. The diversified floor of this great trough varies in elevation from 400 to 2,000 ft. It is continued northwards by the Hudson valley,

and the Lake Champlain and St. Lawrence lowlands.

To the W. of this divide, the Appalachian plateau extends southward from the Mohawk valley through the Allegheny plateau, the Catskills, the Alleghenies, and the Cumberlands. It has steep eastern escarpments and



a gentler western slope towards the Ohio-Mississippi valley. The Adirondack Mts., which appear from a map to be a northward continuation of the plateau, are geologically unconnected.

The rivers Delaware, Susquehanna, Potomac, and James rise in the western plateau and flow to the Atlantic. In the S. the major breaks are made by the Kanawha, Tennessee, and Cumberland rivers flowing W. to the Ohio.

The Appalachians presented an important barrier to the westward movement of population, not

overcome until the construction of E.-W. roads and railways in the 19th century. The Hudson-Mohawk-Champlain depression is the only easy natural way through.

**Appalachian Way.** Great U.S. highway nearly 1,000 m. long. It runs S.E. from Chicago, Illinois, to the Atlantic coast at Charleston, S. Carolina, much of it through the outstandingly beautiful scenery of the Cumberland, Clinch, and Black mountain ranges.

**Apparition.** Literally, a thing seen; hence applied to ghosts and other supernatural appearances, and to visual hallucinations. Belief in apparitions is found in all ages and among all peoples, notably in the idea that the soul, spirit, or eidolon revisits the body or the grave of the body after death; it received impetus from the growth of spiritualism, clairvoyance, and experimental telepathy. Most scientists assign apparitions to purely physiological causes. Yet, apart from historical records or traditions of apparitions, many persons in normal health have testified that they have seen apparitions of dead relatives or friends, or of living persons they knew to be at a distance at the time of the appearance.

**Apparitor.** Officer of the English ecclesiastical courts whose duty it is to summon a defendant. The term is also used by some colleges and other institutions as an alternative to beadle or herald. In Rome an apparitor was the executive attendant of a magistrate.

**Appeal.** In law, the process by which the decision of a court or other tribunal may be reviewed by a higher court or tribunal. In English law appeals are often restricted to points of law (i.e., assuming the facts to be as the lower court held, was the decision right in law?), or are allowed only if some doubtful and important point is involved. In many of the administrative tribunals set up in England during the 20th century the right of appeal is very much restricted.

In England there is in civil cases a court of appeal manned by lords justices who hear appeals from the chancery, queen's bench, and probate, divorce, and admiralty divisions of the high court of justice, from county courts, and from certain other courts and judicial bodies.

From this court there is the right of appeal with leave to the house of lords, which, as a court, consists of peers of high legal



attainments. In Scotland the inner house of the Court of Session is the court of appeal to which cases from the outer house are taken. Northern Ireland has a court of appeal on the English model. From these two there is a further and final appeal to the House of Lords. These courts deal only with civil cases, but for criminal cases England has a court of criminal appeal established in 1907; this consists of the Lord Chief Justice and some judges of the Queen's Bench Division. From the lower courts there is also the right of appeal. From courts of summary jurisdiction cases can go to quarter sessions, and from quarter sessions (on legal points) to a divisional court, composed of judges of the High Court. There is a like sequence in Scotland and Northern Ireland. The Scottish court of criminal appeal was set up 1926.

Canada and Australia, being federations of provs. (states), have each a court of appeal to which cases from the provincial courts are referred; the various provinces (states) have also their courts of appeal. From the supreme courts of Canada, Australia, South Africa, New Zealand, and other parts of the British Commonwealth, the final court of appeal was long the judicial committee of the privy council; but in 1949 Canada, and later others of the dominions, passed legislation ending this. The judicial committee is the supreme court for ecclesiastical cases and cases under the Naval Prize Acts.

Most foreign countries have courts of appeal graded in somewhat similar fashion. The U.S.A. has a Supreme Court. France has a court of cassation for civil cases and another for criminal cases.

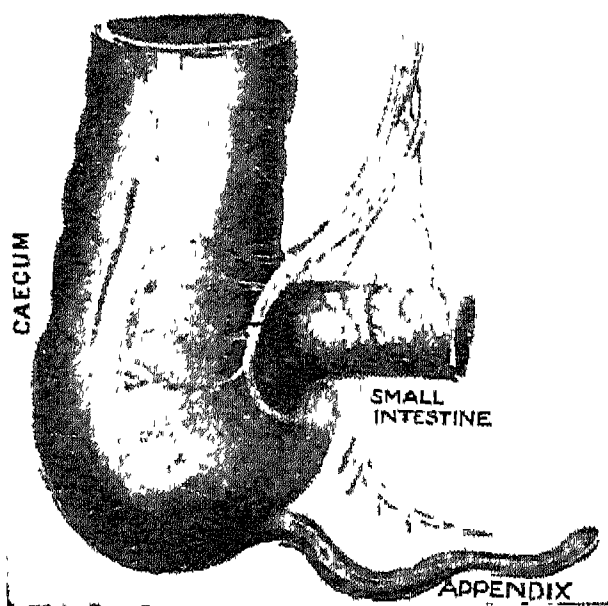
The principle of the appeal, although sometimes abused, is thoroughly equitable, and gives the litigant every chance of obtaining justice. In England, as a rule, appeals will only be against a decision or ruling that is wrong in law; but the Courts of Appeal will also reverse a decision where there has been a palpable mis-trial on the facts, *e.g.* where the verdict of a jury is "perverse," or such as no reasonable body could have given on the evidence; and the court of criminal appeal can amend a sentence or quash a verdict on the ground of judicial misdirection to the jury.

**Appearance.** A term used in English law. Proceedings in the High Court of Justice are begun by a writ or an originating summons,

which is served personally on the defendant or on his solicitor. The defendant, if he wishes to defend the action, must file, at the appropriate office in the High Court, a paper which says, "Enter an appearance for the above-named A.N. (defendant)," and must serve a copy on the plaintiff or his solicitor. This is the appearance.

**Appellants.** Name given in 1387 to Thomas, duke of Gloucester, Richard, earl of Arundel, Thomas Beauchamp, earl of Warwick, Henry, earl of Derby, afterwards King Henry IV, and Thomas Mowbray, earl of Nottingham. In a manifesto issued at Waltham on Nov. 14, 1387, they "appealed" of treason five of Richard II's friends.

Both the king's friends and his enemies collected troops; at Radcot Bridge, in Oxfordshire, the former were routed, and the appellants were masters of the land. They ruled England for over a year;



Appendix, or vermiform appendix, showing its position at the base of the caecum

they and their friends secured the great offices of state, while their foes were put to death without mercy. In May, 1389, Richard II regained control of the government, but it was not until 1397 that he felt strong enough to punish the appellants. In August they in their turn were "appealed" of treason by eight appellants—friends of the king. Gloucester was murdered in prison at Calais, Arundel and Warwick were tried and executed, while Derby fled the country, soon to return and supplant Richard on the throne. Mowbray had gone over to the king's side, and was rewarded with the title of duke of Norfolk. Consult *Constitutional History*, W. Stubbs, Vol. iii, 5th ed., 1903.

**Appendant** (Lat. *ad*, to; *pendere*, to hang). English legal term. Where a right of property, of an accessory kind, is attached to another, so as to be enjoyed with it, it is described as appendant or appurtenant. It is appendant only if it was acquired by prescription—

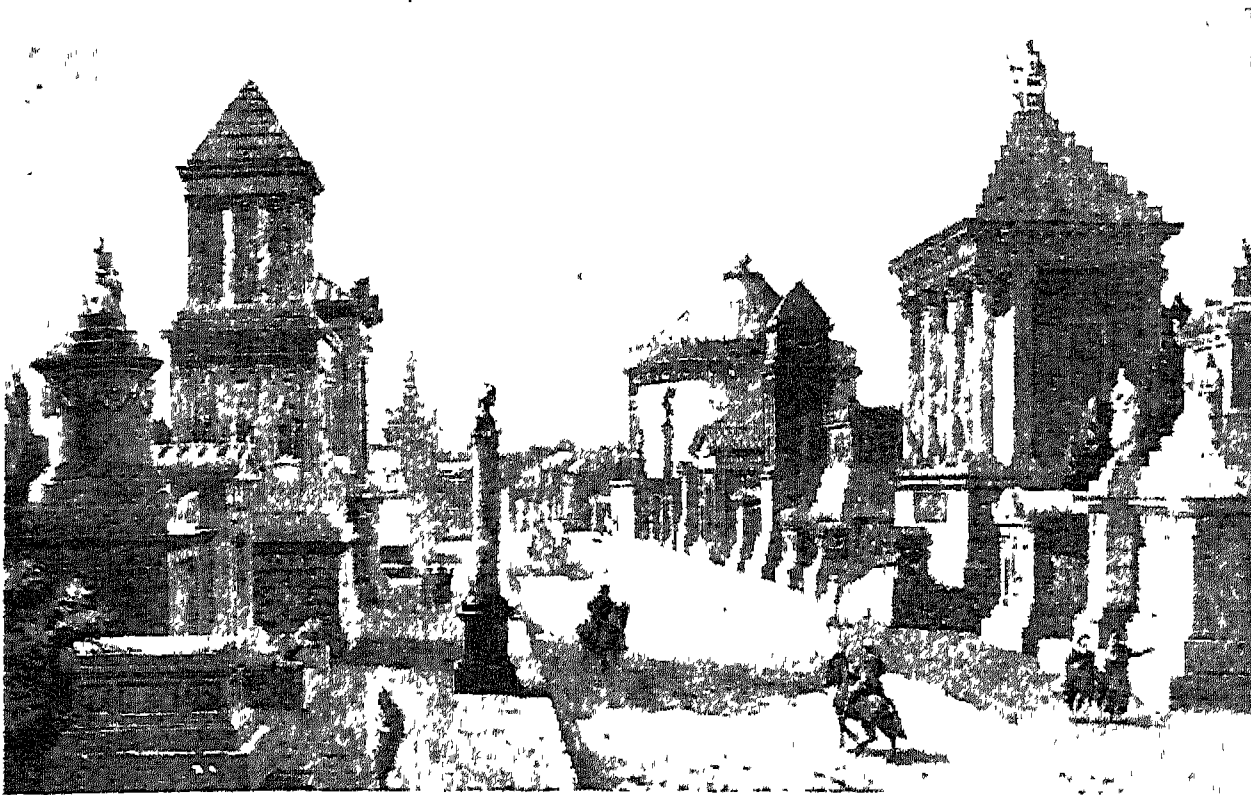
that is, by enjoyment from beyond the time of legal memory (Richard I). If acquired in any other way it is appurtenant. Thus, A. B., as a freehold tenant of a manor, will probably have as appendants to his freehold certain rights of common—estovers, botes, piscary. These pass with A. B.'s freehold, and are inseparable from it. See *Appurtenant*; *Land and Land Laws*.

**Appendicitis.** Inflammation of the vermiform appendix, a small blind prolongation of the caecum. Acute appendicitis is more common in the child; chronic appendicitis in the adult. The appendix may be infected by organisms present in the bowel or carried to it by the blood stream, bacillus coli, streptococci, and staphylococci being the commonest. Foreign bodies are an infrequent cause. The commonest of all causes is a concretion of dried faecal matter impacted in the lumen.

In acute appendicitis the onset is sudden with severe pain and possibly vomiting and collapse. The pain, especially in children, is mostly round the umbilicus, before it settles in the right side of the lower part of the abdomen. The slightly varying position of the appendix makes this pain uncertain in degree and place. Temperature and pulse-rate rise. Persistent vomiting is common. Diarrhoea may be present and may give way to constipation. Tenderness and pain are present over the right rectus muscle, which is rigid. Appendicitis is much the commonest of the acute inflammatory conditions of the abdomen in those who are under middle age. Early operation is the right treatment. The condition if left alone may recover, but the patient has a greater liability to subsequent attacks. At any stage operation is equally indicated.

In chronic appendicitis the diagnosis rests on the history of sub-acute attacks. A diseased appendix may give rise to gastric symptoms which are unrelieved by food and are made worse by fatigue. It is an important point in diagnosis that dietetic treatment is of no help. Recovery follows the removal of the appendix, but this recovery may take some time.

A purge should never be given in the presence of abdominal pain until the cause is proved not to be appendicitis. When modern surgery and asepsis are considered, danger lies not so much in removing the appendix as in leaving it possibly to become gangrenous and cause peritonitis.



**Appendix** (Lat. *ad*, to; *pendere*, to hang). Word used in two senses: (1) of books and official reports, to indicate additional matter. This is in the shape of documents explanatory of, or supplementary to, the ordered statement contained in the main body of the work. It is either placed at the end or issued in a separate volume or volumes, *e.g.* an appendix to an encyclopedia. (2) In anatomy, the vermiform appendix, a small blind prolongation of the caecum or large intestine, illustrated on p. 500. See Appendicitis.

**Appenzell.** Canton of N.E. Switzerland. It was made from the possessions of the abbots of St. Gall, its name coming from Latin *abbatis cella* (abbot's cell). The canton of St. Gall surrounds it. An Alpine district, it reaches in Mt. Sentis 8,215 ft. It was divided in 1597 into Inner Rhoden (Inner Rhodes), area 67 sq. m., pastoral with R.C. pop., and Ausser Rhoden (Outer Rhodes), area 94 sq. m., industrial and Protestant. German is the language of both parts, each of which retains its primitive democratic annual assemblies. The canton has muslin and cotton industries. There is a meteorological observatory on Mt. Sentis. Appenzell (pop., 1950, 4,983) is the capital of Inner Rhodes. It has a castle with an historical museum. Herisau (*q.v.*) is the capital of Outer Rhodes.

Freed from the abbots' rule in 1405, in 1411 Appenzell obtained the protection of the Swiss Confederation, receiving full membership 1513. Pop. (1950) Inner Rhodes, 13,437; Outer Rhodes, 47,938.

**Apperception** (Latin *ad*, to; *percipere*, to perceive). In general, becoming aware of something by active, conscious thought as opposed to passive sense perception. Leibniz first introduced

the term for clear ideas as distinguished from vague perceptions; Kant insisted upon the spontaneity of the mental activity, as something not derived from experience. Herbert regarded apperception as the appropriation and elaboration of new (apperceived) ideas by older (apperceiving) ideas; mind is the resultant of the effects of the apperceiving and apperceived "masses." According to Wundt, apperception is the apprehension of an idea by attention. Comparing the act of consciousness to an internal act of vision, he distinguishes the vaguer "field" of vision from the clearly marked "point" of vision. Apperception is the entrance of an idea into the point of vision, perception its entry into the field of vision. See Metaphysics.

**Apperley, CHARLES JAMES** (c. 1778–1843). Writer on sport under the pseudonym of Nimrod. Born at Plasgronow, Denbighshire, and educated at Rugby, he wrote first for *The Sporting Magazine* and afterwards for *The Sporting Review*. His chief publications are: *Nimrod's Hunting Tours*, 1835; *The Chace, the Turf and the Road*, 1837; *Memoirs of the Life of the late John Mytton, Esq.*, 1837; and *The Life of a Sportsman*, 1842. The first editions of these works, with illustrations (hand coloured) by Alken and other artists, are very scarce. Apperley died in Pimlico, May 19.

1843. Consult *Life and Times of "The Druid,"* F. C. Lawley, 1895; *Kings of the Hunting Field*, W. W. Dixon, 1899.

**Appetite** (Latin *ad*, to; *petere*, to seek). Desire or relish for food. Disorders of appetite may be diminished desire for food, increased desire, and perverted appetite. Diminished appetite can be caused by absence of vitamin B. This can be replaced by taking brewer's



**Appian Way.** Upper, reconstruction of this road as it probably appeared just outside the city of Rome. Lower, the Appian Way today, trees growing among the tombs which once so thickly bordered it. See p. 502

yeast. Increase of appetite is often observed in convalescence from acute illness, such as typhoid fever, after the stomach has been long inactive, and in conditions such as diabetes, where there is an abnormal drain of nutritive material from the system. Unnatural appetite can be a manifestation of mental disorder, and may occur in pregnancy.

**Appian** (Gr. *Appianos*). Roman historian. Born at Alexandria, he flourished in the middle of the 2nd century A.D. He practised as an advocate in Rome and was afterwards administrator of finance in Egypt. His *Romaica* or *Roman History*, written in Greek in 24 books, of which only 11 are completely preserved, describes in sections the history of various peoples until their incorporation in the empire. The account of the civil wars of Rome is the most important and is based on authorities no longer available. The work is uncritical and inaccurate; the narrative is clear, though uninspiring. Eng. tr., H. White, new ed. 1912.



**Appian Way.** Most famous Roman road, built from Rome to Capua in 312 B.C. by the censor Appius Claudius Caecus. Carried subsequently to Tarentum and, in 264 B.C., to Brundisium, it became the highway to the East. It left Rome by the Porta Capena, but the city gradually extended along it and the Porta Appia (modern Porta San Sebastiano) was built in A.D. 272 for its passage through Aurelian's Wall. Remains of numerous magnificent tombs built beside it can be seen along the well preserved stretch of the road outside Rome.

The New Appian Way is the modern road from Rome to Naples. It runs from the Porta San Giovanni almost parallel with the old road, which it rejoins at the foot of the Alban Hills.

**Appin.** Mountainous district of Argyllshire, Scotland. It lies along the E. shore of Loch Linnhe, between Lochs Leven and Creran, and includes Glencoe. The highest

point is Ben Vair (3,362 ft.). Port Appin is a port of call for steamers.

**Appin Murder.** Name given to the murder of Colin Campbell of Glenure, May 14, 1752. Alan Breck Stewart—the Alan Breck of Stevenson's *Kidnapped* and *Catriona*—a deserter from the English army, was indicted for the murder, and James Stewart as an accomplice. Breck, against whom there was no evidence, fled to France. Stewart, though a rebel of 1715 and 1745, was on good terms with Campbell, and had been pardoned. Campbell was the factor of the confiscated estates of the Stewarts, but James Stewart had been allowed to administer the property. He was arrested for the murder, tried by a jury of Campbells at Inveraray, Sept. 21–25, 1752, and hanged. There is no reason to suppose Stewart had any knowledge of the murder, and this execution was ordered to impress the still disaffected areas. The real murderer is unknown.

## APPLE: THE FRUIT AND ITS GROWTH

H. H. Thomas, Editor of *Popular Gardening*, 1907-47

*Describing Great Britain's most widely cultivated fruit and the way it is grown. Similar articles describe the Pear, Plum, Strawberry, and other fruits. See also Cider; Fruit; Orchard, etc.*

The apple (*Pyrus malus*) belongs to the family Rosaceae and originated in the Caucasus where the wild indigenous tree is still widely distributed. The tree is deciduous and the fruit is a pome with five carpels (the core) each containing two seeds; it is surrounded by a fleshy receptacle which is the edible part. The apple figures prominently in Greek and Scandinavian mythology. Charred remains of apples have been found in Swiss lake dwellings.

The apples of today descend from the crab-apple; for many generations new varieties have been raised from seed. Some of the seedlings were raised by artificial cross-fertilisation of the blossoms of chosen varieties, others merely by saving the pips from the best apples available at the time, and sowing them. As a result of these processes, carried out during many years, hundreds of varieties of apples have been raised, though only a limited number are in general cultivation.

Much valuable work has been done in renovating neglected British orchards and in bringing the trees into a fruitful condition. Experiments by horticultural research workers have been of the greatest help to fruit growers in providing information as to the

best stocks for the trees, in classifying apples according to whether they are self-sterile or self-fertile, and in the best methods of controlling the pests and diseases of fruit trees by the use of new types of insecticide and fungicide. These matters, together with improved methods of grading and packing, have enabled growers to keep abreast of the times and have resulted in the marketing of better produce. Home-grown apples are plentiful from August until early in the New Year, but late varieties which will keep in good condition are still needed. Large quantities of apples are imported, for the home-grown supply does not meet the demand.

The stocks on which apples are budded or grafted influence the growth of the trees and determine the period which must elapse before fruit-bearing begins. Standard trees, budded on the crab stock, are not likely to bear good crops in less than 10 years. They have a 6 ft. stem clear of branches, live to a great age, and when mature yield heavy crops. They are more suitable for orchards and large gardens than the small gardens of amateurs. The half standard, which has a clear stem of about 4 ft., is to be preferred for small gardens.

For general planting in gardens the most profitable type of tree is the bush apple; it has no main stem but consists of a number of branches which arise from near the base of the tree. It is generally budded on the broad-leaf paradise stock or Malling No. 1, comes into fruit-bearing in from 3 to 5 years, and continues profitable for an indefinite period. Trees budded on the Jaune de Metz or Malling No. IX stock are less vigorous, can be planted more closely, but are scarcely so profitable over such a long period as those on the broad-leaf paradise stock.

Although the bush-shaped tree is ideal for planting in the open garden, the various forms of trained trees are exceedingly useful, and profitable too, for setting against a wire trellis or for training over arches. The two chief types of trained apple tree are the single-stemmed cordon and the horizontal espalier which has tiers of horizontally trained branches, each tier about 12 ins. above the other. The horizontal cordon, which has a 12-in.-high stem and one branch on each side, trained in a horizontal direction, is particularly useful for planting along the sides of garden paths. Cordons with two or even three stems can be bought.

### Planting Apple Trees

Apple trees must be planted at the correct distances apart if they are to have a long and profitable life. Full standards should be set at 18 ft., half-standards at 15 ft. apart. Bush-shaped trees on the broad-leaf paradise stock should be put at 12 ft., and those on the Jaune de Metz stock at 9–10 ft. from each other. Single-stemmed cordons ought to be planted at 2 ft. apart, horizontal espaliers at 12 ft. apart, and horizontal cordons at 10 ft. apart.

The best time to plant apple trees is in autumn as soon as the leaves have fallen or have changed colour preparatory to falling. November is the ideal month for the work, but planting may be carried out during mild weather in winter when the ground is not sodden, and continued until the end of March if necessary. Trees planted in early spring, however, will make less satisfactory progress the first year than others planted in autumn. Standard trees should be staked securely to prevent their being blown about in windy weather.

The ideal situation for an orchard or fruit garden is on well-drained land facing S. or S.W., but



Apple. 1. Erect growing habit of Dutch Mignon. 2. Cox's Orange Pippin, which has a more horizontal habit of growth. 3. Beauty of Kent, another distinct type. 4. Cox's Orange Pippin, considered the best dessert apple. 5. Bright red fruit of Beauty of Bath. 6. Lady Sudeley. 7. Bramley's Seedling, a late cooking apple and a good keeper. 8. Laxton's Superb

most amateurs have to make the best of the sites afforded by their plots of ground. Although clayey loam is the ideal land, apple trees will thrive in almost any soil that is manured correctly.

A mulch or soil-covering of manure or decayed vegetable material, if put on the ground round about the trees in May, will help to keep the roots moist, and that is a detail of importance. The following autumn and in the autumn of alternate years subsequently, basic slag should be scattered on the soil near the trees, using 6 oz. per sq. yd. of ground. After the first year the use of sulphate of potash in spring at 2 oz. per sq. yd., and superphosphate of lime in June, applying 3 oz. per sq. yd., will prove beneficial; or a complete fruit tree fertiliser may be used in May after the blossoms have fallen.

It is not usual to prune newly planted standard, half-standard, and bush-shaped apple trees until a year or so has passed: trees planted in autumn should be pruned in Dec. of the following year. The main branches are then shortened by about two-thirds, and any side shoots are cut back to within two buds of the base.

In subsequent years the usual practice is, in summer, to prune the side shoots to within about five leaves of the base of the new growth, and in winter to cut them back again to two or three buds. The leading shoots, those at the ends of the main branches, are not pruned in summer but are shortened by half or, if weakly, by two-thirds at the winter pruning. The best period for summer pruning is from mid-July to the end of Aug.; the winter pruning may be done in Dec., Jan., or early Feb.

What is known as Lorette pruning, a system devised by a French grower of that name, now finds favour with many growers. In the modified form suited to apple trees grown in this country, it is practised by cutting down all long side shoots in summer to within a quarter-inch of the base; this in effect means cutting off the shoots altogether. The object is to force into growth those dormant buds which lie at the extreme base of the side shoots, for many of these are capable of producing blossom buds.

Lorette pruning is practised throughout the months of July and Aug. and until early Sept., for the shoots must be pruned only when they are firm and slightly woody at the base. The leading shoots, those which extend the main branches, are pruned in early spring before growth starts



by shortening them by one half or by two-thirds if not very strong.

The greatest care should be taken in making a choice of varieties for planting, for some are more reliable than others. It has been discovered that certain varieties of apple are self-fertile, i.e. they will set a crop of fruit even when planted alone; others are self-sterile and will not bear fruit unless their blossoms are cross-fertilised with pollen from the blossoms of other apple trees. In practice it is found best to have a mixed plantation of both dessert and cooking apples.

These are some of the best self-fertile apples. (D. denotes dessert C., cooking apples. The period in which the fruits are at their best is indicated):

Potts's Seedling (C., Aug.-Sept.).  
Laxton's Exquisite (D., Sept.).  
St. Everard (D., Sept.).  
Rev. W. Wilks (C., Oct.).  
Laxton's Fortune (D., Sept.-Oct.).  
Cellini (C., Sept.-Oct.).  
James Grieve (D., Sept.-Oct.).  
Egremont Russet (D., Oct.-Nov.).  
Lord Lambourne (D., Oct.-Nov.).  
Lord Derby (C., Nov.-Dec.).  
Laxton's Superb (D., Dec.-March).  
Bramley's Seedling (C., Nov.-Jan.).  
Crawley Beauty (C., March-April).  
Annie Elizabeth (C., March-May).  
Cox's Orange Pippin, one of the most delicious of all apples, is self-sterile: it should be planted near Worcester Pearmain and James Grieve.

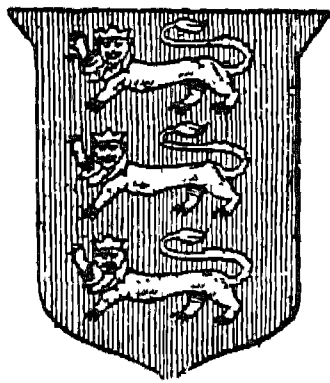
The early apples, those which ripen in Aug.-Sept., should be eaten from the tree, or stored only for a few days. Apples which are stored for use in late autumn, winter, and early spring must be left on the trees as long as possible or they will shrivel and lose flavour. Apples keep best in a cool and rather damp, frost-proof shed. The choicest fruits should be wrapped in paper before being put away. A dry airy attic is an unsuitable place for storing apples.

Apple trees are unfortunately subject to the attacks of many pests and diseases and these must be prevented or reduced to a minimum to ensure a harvest of sound fruits. The following are the measures of control generally practised. Greasebands are placed on the tree stems in Sept.; spraying with a tar-oil caustic wash is done in Dec.-Jan., or with other suitable wash. e.g. Thiol, in Feb.-

March; spraying with nicotine insecticide, just before the blossoms open and again as soon as they have fallen, and with lime sulphur in May and July to prevent brown rot and scab respectively. Placing bands of corrugated paper or sacking on the stems in May and taking them off and burning them in autumn will check the troublesome apple blossom weevil. The use of a brush dipped in methylated spirit or paraffin will destroy American Blight.

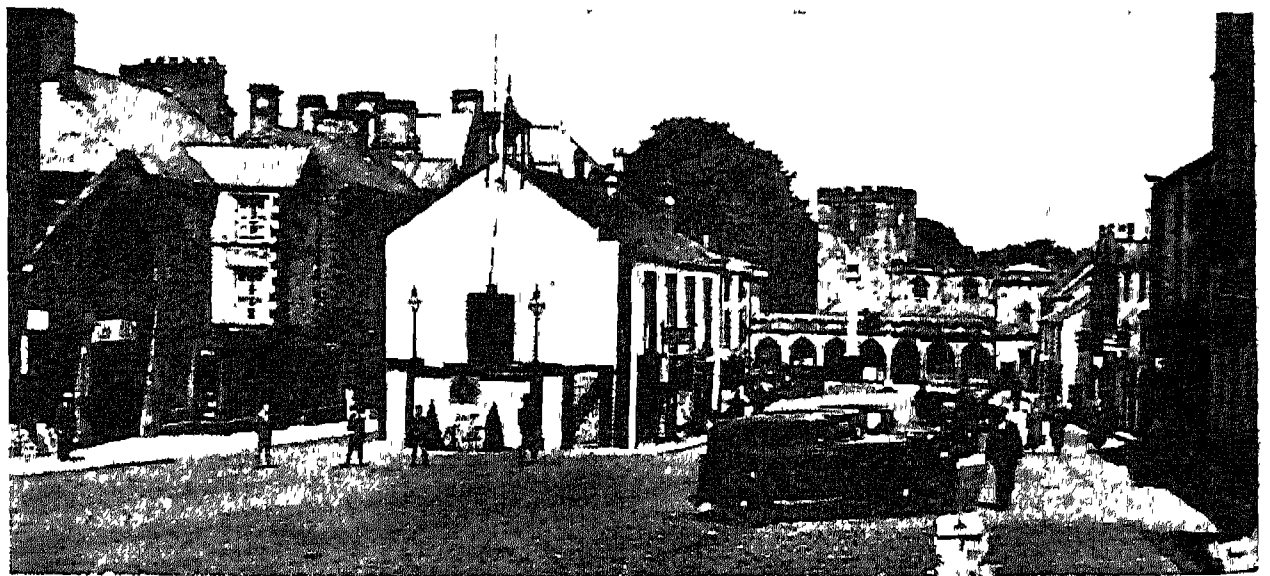
*Bibliography.* The Apple, A. E. Wilkinson, 1915; Apples and Pears, E. A. Bunyard, 1920; Handbook of Hardy Fruits, E. A. Bunyard, 1920; Commercial Apple Growing, A. H. Hoare, 1937.

**Appleby.** Mun. borough, market town, and co. town of Westmorland, England. It is picturesquely situated on the Eden, 30 m. S.W.



Appleby arms

of Carlisle, with good rly. services. It has town and shire halls, a grammar school founded in 1453, an old church, and a rebuilt castle with Norman keep. Appleby received charters from Henry II and other monarchs, but was incorporated on modern lines in 1885. It returned two members to Parliament from the end of the 13th century until 1832. Appleby was prominent in Roman times, was destroyed by the Scots in 1176 and 1388, aided the Royal-



Appleby, Westmorland. Boroughgate, the main thoroughfare, with the cloisters and the church of S. Lawrence in the background

ists in the Civil War, and was taken by the Parliamentarians after Marston Moor. Market day, Sat. Pop. (1951) 1,705.

**Apple Cart,** THE. Play by Bernard Shaw, described by him as a political extravaganza. First performed in Warsaw in the Polish version by Sobieniowski, it was produced by Sir Barry Jackson

at the Malvern festival on Aug. 19, 1929. It was transferred to the Queen's Theatre, London, the following month. The principal characters were played by (Sir) Cedric Hardwicke (King Magnus), Charles Carson (prime minister), and Edith Evans (Orinthia).

**Appledore.** Seaport of Devon, England. At the junction of the Taw and Torridge estuaries as they flow into Barnstaple Bay, it is ancient, narrow, and cobbled. There is a ferry to Instow, and interesting places within walking distance include Bideford, Northam, and Westward Ho. Ship repairing is one of the industries. Market day, Sat. Another Appledore is on the edge of Romney Marsh, Kent.

**Appleton.** Village of Berkshire, England, 7 m. S.W. of Oxford. On April 22, 1922, there was rung on the ten bells of the church a peal of Stedman Caters of 21,363 changes, lasting 12 hours 25 minutes, the longest peal rung in Britain by one set of men. Other feats of bell-ringing are also recorded in the church, which itself contains work of c. 1180 (Transitional).

**Appleton.** City of Wisconsin, U.S.A., and the co. seat of Outagamie county. Situated on the Grand Chute Rapids of the Fox river, which supply power for numerous paper, flour, woollen, and saw mills, it is 98 m. N.W. of Milwaukee, by the Chicago and N.W. rly. It has large breweries and foundries, makes chairs, spokes, hubs, etc., and is the seat of Lawrence College. Pop. (1950) 34,010.

**Appleton,** SIR EDWARD VICTOR (b. 1892). British scientist noted for his work in radio and radar. Born at Bradford, Sept. 6, 1892, the son of a mill worker, he was educated at Hanson School, Bradford, and St. John's, Cambridge. After working under Rutherford in the Cavendish laboratory, Cambridge, he was Wheatstone professor of physics

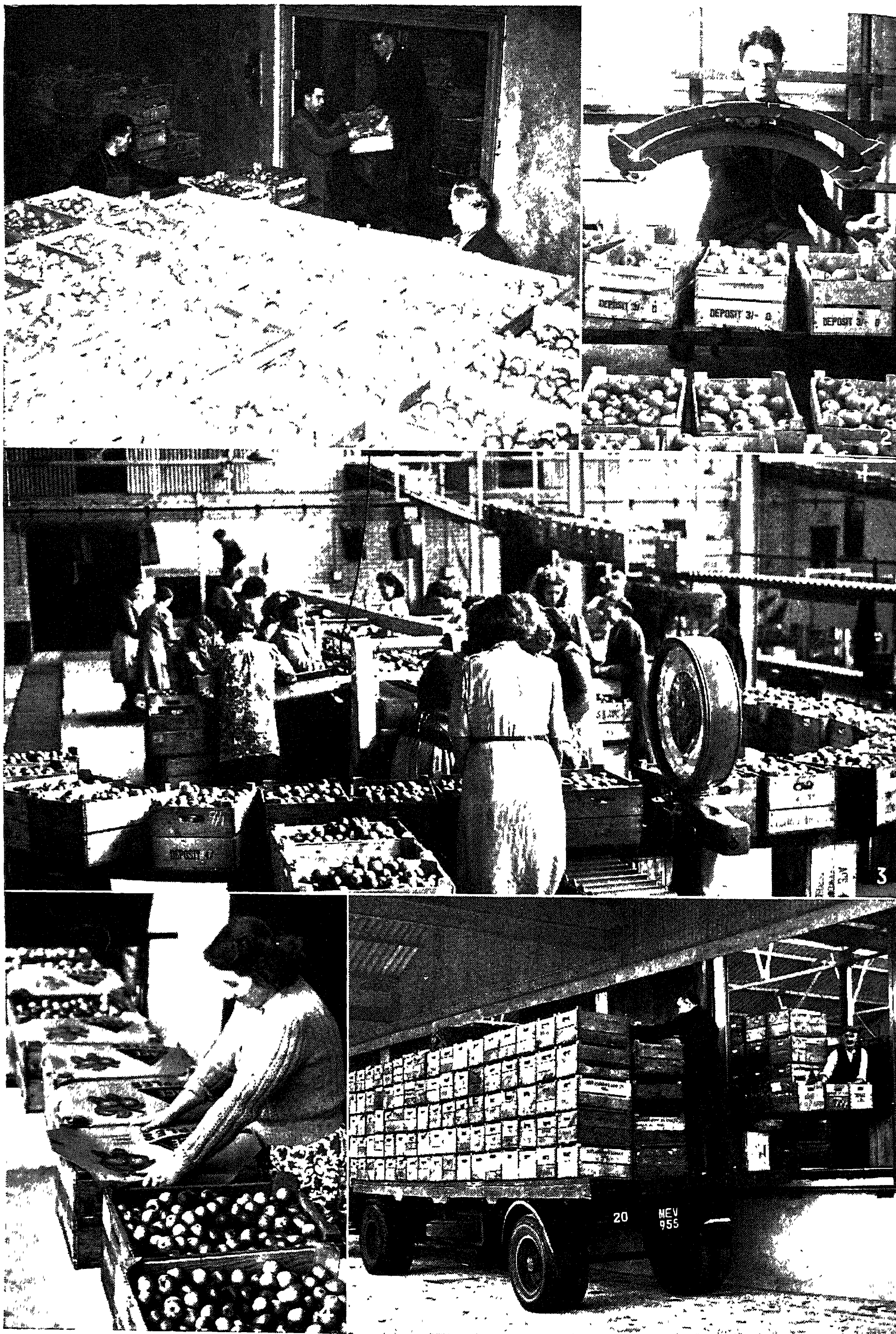




1. Cox's Orange Pippin; dessert. 2. Lane's Prince Albert; cooker. 3. Bramley's Seedling; cooker. 4. Newton Wonder; cooker. 5. Red Soldier; cider apple. 6. Blenheim Orange; cooker and dessert. 7. Laxton's Superb; dessert. 8. Charles Ross; dessert. 9. American Mother; dessert

# APPLE: VARIETIES FOR COOKING. DESSERT AND CIDER-MAKING





1. Removing apples from a refrigerated store preparatory to grading.
2. Special gauge used in grading for size.
3. Graded and sorted apples being packed in boxes which travel on a conveyor belt.
4. Covering the boxes in the dispatching room.
5. Full boxes being loaded on a lorry to be taken to market

#### APPLE: GRADING AND PACKING THE FRUIT FOR MARKET



Sir Edward Appleton,  
British scientist

at London university, 1924–36; then Jacksonian professor of natural philosophy at Cambridge. He was secretary of the D.S.I.R. 1939–49. Elected F.R.S. in 1927, for his researches into radio and radar he won the 1947 Nobel prize for physics. In 1945 he became the British government's chief scientific adviser, and in 1949 principal and vice-chancellor of Edinburgh university.

**Appleton Layer** OR F LAYER. Layer (named after Edward Appleton *v.s.*) of highly ionised air *c.* 150 miles above the earth, caused by the absorption of ultra-violet light from the sun. The presence of ions and electrons in this layer means that the air is partially conducting so that electro-magnetic waves are reflected by it. At about 60 miles above the earth is a lower layer of ionised air called the Heaviside Layer (*q.v.*). The ion density here is not as high as in the Appleton layer. Short-wave electro-magnetic radiations pass through the Heaviside layer, and are reflected at the Appleton layer. Long-distance transmission of radio signals depends upon this reflection to bend the wireless waves round the curvature of the earth.

**Appoggiatura** (Ital. *appoggiare*, to lean). Name of an ornamental musical note preceding an



essential note. An appoggiatura takes the accent from the following note, and also an appreciable amount of its time value, viz. half of an ordinary note or two-thirds of a dotted note. The appoggiatura was originally written as a small note, without a dash through the stem (Acciacatura), but today it is customary to write the exact time value in ordinary notation.

**Appointment.** Term used in English law. Where property is settled so as to give someone called the appointor the right to dispose of it, though the appointor is not the owner, an exercise of this right is called an appointment. For example, "I give my property to trustees, X and Y, to pay the income to my wife, A, during her life, and after her death to divide the property

amongst such of my children as she shall appoint by deed or will." A's deed or will by which she exercises this power over her husband's property is an appointment.

**Appomattox.** Village of Virginia, U.S.A., capital of Appomattox county (pop. 1950, 8,764). At the court house here the main Confederate army under Robert E. Lee surrendered to Ulysses S. Grant, April 9, 1865, at the end of the American Civil War.



Appomattox. General Lee surrenders to General Grant, April 9, 1865: from a contemporary print

**Apponyi, COUNT ALBERT** (1846–1933). Hungarian politician. Son of Count George Apponyi, he joined the Liberal party in 1899 and was president of the chamber of deputies 1901–1903. Leaving the Liberal party in 1903, he became leader of the new National party. He was made minister of education in 1906 in the Wekerle cabinet and again in June, 1917, in the Esterhazy cabinet, and minister of public instruction in the reorganized Wekerle cabinet. Jan., 1918. He retired in Nov., 1918, but came forward in Jan., 1920, to lead the delegation to Paris to settle the peace with Hungary. Later he represented Hungary in the League of Nations. He died Feb. 7, 1933. *Consult* *Memoirs*, 1935.

**Apportionment.** English legal term, meaning the division of a whole between several claimants. Apportionment arises mainly (1) when one person being entitled to the capital of certain property and another entitled to the income, it is necessary to allocate sums received to one or the other according as they are capital or income: this is apportionment as to estate; (2) when one person (A) entitled to the income dies, and another person (B) thereupon

becomes entitled to it, it is necessary to divide a sum of money received after A's death, but due for a period in part before and in part after the death, between A's representatives and B: this is apportionment in respect of time, and arises under the Apportionment Act, 1870.

By that act all rents, interests, and periodical payments are deemed to accrue from day to day, and to be apportionable.

**Apposition** (Lat. *ad*, to; *ponere*, to place). In English grammar, when a noun or noun equivalent is immediately followed by another noun in the same case, which amplifies or limits the first, the two are said to be in apposition. For example, in the phrase "Elizabeth, our Queen," Elizabeth and Queen are in apposition, Queen having lost none of its force as a noun. When a descriptive noun precedes the qualified noun it becomes adjectival, as in "Queen Elizabeth." Here, Queen is an adjectival noun, and the two are not in apposition.

**Apprehension** (Lat. *apprehensio*, laying hold of). Philosophical term for the act or power of grasping with the intellect. According to Kant, this faculty plays a great part in the formation of concepts. All concepts are subject to time, and the mind must distinguish the time in the succession of impressions. Concepts arise from the synthesis into a single whole of the manifold elements apprehended.

The term is used also for the simple act of viewing an object, as opposed to comprehension in which one object is related to others.



**Apprenticeship.** System of training for skilled occupations in which boys and girls undertake to serve under a particular employer for a certain time in return for full training in a particular occupation, or craft, with appropriate pay. During the Middle Ages the system was developed by the guilds in a strict form under which the exact terms of apprenticeship were laid down in a contract or indenture. The guilds favoured the system as it facilitated regulation of the numbers of entrants to each craft and ensured proper training of skilled workers; and in 1563 the Statute of Apprentices laid down that no one should exercise any "craft, trade, or mystery" unless he had first served an apprenticeship of seven years.

The development of new methods of production and new industries, and the growth of new towns without local guilds, made enforcement of the law difficult. By the end of the 18th century disregard of the law was general in the rising factory industries in which many processes required only semi-skilled or unskilled labour; and in 1814 the law was repealed.

Although the rapid growth of mechanisation since then has greatly increased the number of processes requiring only unskilled or semi-skilled labour, there is probably no industry which can do without some skilled workers. Hence in many occupations trade unions have endeavoured to maintain the old system, with varying success, and conditions of apprenticeship are often matters for discussion between trade unions and employers' associations; nevertheless apprenticeship, when it exists today, is often of a very loose type and may vary from employer to employer within the same industry. Particularly since the First Great War, young people have become less willing to undergo full training, partly because in unskilled occupations they can earn more than apprentices, and partly because the disparity in earnings between adults in skilled and semi-skilled or unskilled occupations had been declining. Employers, on the other hand, are often unwilling to implement an apprenticeship scheme which is not generally enforced, as employers who ignore it benefit from the supply of skilled labour which others have trained.

In the U.K., the raising of the school leaving age and the continuation of compulsory national

service after the Second Great War further increased the practical difficulties of maintaining the old type of apprenticeship. The services provided some training, and various attempts were made to develop alternative systems of ensuring adequate numbers of skilled workers, *e.g.* the provision of training courses in technical schools in cooperation with trade unions and employers' associations, and schemes organized by the ministry of Labour for training ex-service-men. But no generally satisfactory alternative system was developed.

**Approbate.** Legal term. It is a doctrine of law that a man cannot both approbate and reprobate, that is, he cannot both affirm and deny; he cannot both accept a legal instrument and reject it. The principle arises most frequently in relation to succession. If a testator gives his estate to A and gives A's estate to B, then if A takes the testator's estate he must give up his own estate to B. In Scotland, if a testator makes a will which conflicts with the legal rights of his widow or children—*i.e.* *jus relictæ* and *legitim*—the widow and children are usually prevented from claiming their rights under the will as well as their legal rights. They must choose.

**Appropriation.** Term in English law. When a debtor owes more than one debt to a creditor and makes a payment, he may appropriate the payment to whichever debt he pleases. Thus, if I owe my dentist a bill for 1953, another for 1954, and another for 1955, when I send him a cheque I have the right to say "Apply this cheque towards the 1955 account." If the debtor does not appropriate, the creditor may do so; and he can even apply it to paying a debt for which he could not sue, *e.g.* a debt barred by the Limitation Act. In a current account—*e.g.* a bank account—the law appropriates the money to the earliest debt, unless this was manifestly not the intention of the two parties concerned. In parliamentary procedure an Appropriation Act is passed each session, giving authority to spend sums stated in the act for the various purposes of government.

**Appropriations in Aid.** In British finance, cash receipts used by the various government departments towards meeting their gross expenditure. For instance, money received by a dept. as fees for services rendered, from rents, sales of materials, etc., if so shown

in the estimate, is not paid into the exchequer, but is used as appropriations in aid of the expenses of the department.

**Approved School.** Name given under the Children and Young Persons Act, 1933, to institutions formerly called reformatories and industrial schools. An approved school is approved by the secretary of state for home affairs for the reception and training of children under 17. A child may be sent to an approved school for any offence for which an adult could be imprisoned, or if it is in need of care and protection, or with the parent's consent if it is beyond the parent's control. The schools vary according to religious denomination, size, character of buildings, vocational bias, etc. A court does not specify any period of detention. But a child may not be detained longer than 3 years, or 4 months after school leaving age; a young person under 16 for more than 3 years; and a young person over 16 after, normally, his 19th birthday.

**Approver.** Legal term used to describe one who has turned queen's evidence, *i.e.* has given evidence against an accused after having received an assurance from the Crown that, although he was an accomplice with the accused, he will not be prosecuted. The judge must warn the jury of the danger of convicting on such evidence without corroboration.

**Approximation.** In mathematics, a quantity regarded as sufficiently close to the solution of a problem, or the process of obtaining such a quantity. Thus, to obtain an approximate solution of the equation  $x^3 = 5/(x+1)$ , the graphs of  $y = x^3$ ,  $y = 5/(x+1)$  may be plotted, and the  $x$ -coordinates of their points of intersection will give solutions of the equation accurate to within the errors involved in plotting curves and reading off the coordinates of points. Numerical problems solved by the use of logarithms or slide rules yield approximate solutions whose accuracy depends on the accuracy of the tables or the skill of the user of the slide rule. The approximate sum of a convergent infinite Series (*q.v.*) can be obtained by adding up a finite number of terms, the degree of approximation being indicated by the size of the first term neglected.

Newton's formula for the approximate solution of equations states that if  $a$  is an approximate root of  $f(x) = 0$ , then  $a - f(a)/f'(a)$  is a better approximation, where  $f'(x)$

is the differential coefficient of  $f(x)$ . See also Calculus.

**Appurtenant** (Latin *ad*, to; *pertinere*, to belong). English legal term meaning very much the same as appendant. Certain rights of an accessory kind are frequently enjoyed because they are attached to property, and if acquired otherwise than by prescription are called appurtenances. If this is not the case they are called appendants. See Appendant.

**Apraxin**, FEODOR MATVEYEVITCH, COUNT (1671–1728). Russian admiral. He early entered the imperial service, and in 1692 was made governor of Archangel and in 1700 chief of the admiralty. By his efforts the Russian navy was established. In 1708 he successfully defended St. Petersburg against the Swedes, in 1710 captured Viborg in Finland, and in 1713, by inflicting a severe defeat on the Swedish fleet, he made Russia supreme in the Baltic. Fined for embezzlement in 1714 and 1718, he was too valuable to be dismissed, and he accompanied Peter the Great to Persia in 1722. He died at Moscow, Nov. 10, 1728.

**Aprica Pass**. Pass over the Bergamasque Alps in N. Italy. There is a carriage-road from Edolo, in the Val Camonica, to Tresenda, in Val Tellina. The village of Aprica is prettily situated just below the pass.

**Apricot**. A fruit tree of the family Rosaceae, *Prunus Armeniaca*. A native of Asia, it was introduced into England in 1652. The culture is the same as for peaches, but warm S. walls are needed to develop and ripen the fruit. The best soil is loam mixed with sand. Trees should be planted in autumn, and the best system of propagation is by budding in June or July. Under glass the apricot should be planted out in a soil consisting chiefly of lime and burnt wood ashes, and in such a position that light and air can be regulated easily. Sudden currents of icy wind are fatal to the proper ripening of apricots. The word, in French *abricot*, is probably a compound of Arabic *al*, the, and Latin *praecoquus*, prematurely ripe, from late Greek *praikokion*. The earlier English word apricock was derived from Portuguese *albricoque*.

**Apries**. Egyptian king of the XXVIth dynasty (reigned c. 588–568 B.C.). Grecised form of the name Uahabra, it appears as Pharaoh-hophra in Jer. 44. Capturing Sidon by a sea battle, he entered into an unsuccessful league

with Zedekiah of Jerusalem against Nebuchadrezzar II. He was deposed in favour of Aahmes II by a military revolt in Libya. He was then interned at Sais and finally strangled. See Memphis.

**April**. Fourth month of the Christian calendar. The name is usually derived from Latin *aperire*, to open, in allusion to the opening of the buds. The Anglo-Saxon name was Oster-monath, from the spring goddess Eoster, whence Easter. The risings in France in 1834 against Louis Philippe are known as the "days of April." See All Fools' Day; Calendar.

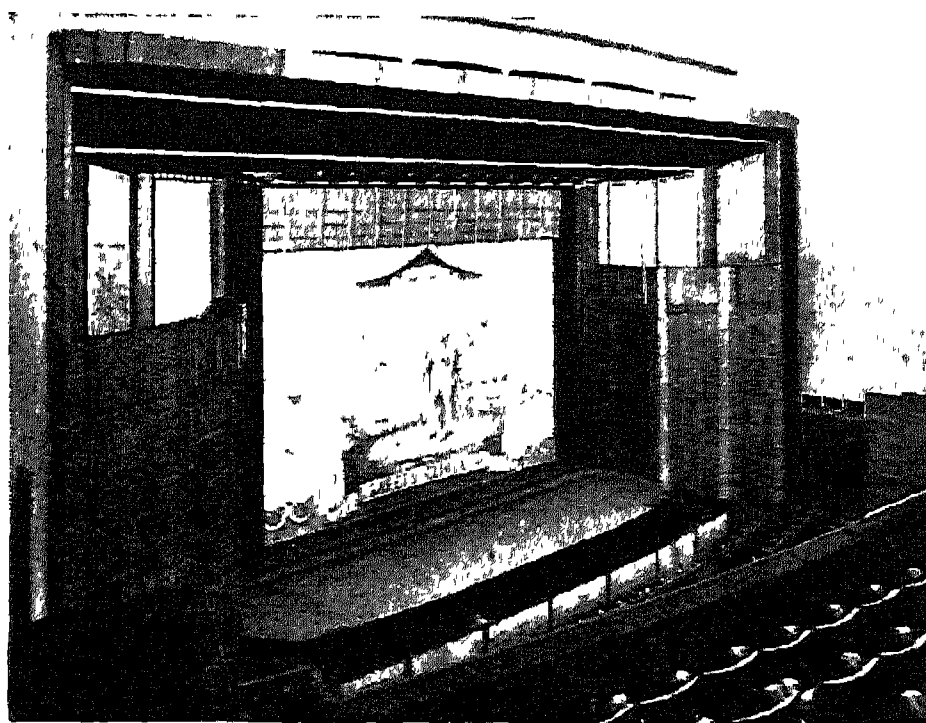
**A priori; a posteriori** (Latin, from the earlier, from the later). Terms closely connected with the question of the origin of knowledge. Aristotle, and after him the scholastics, distinguished *a priori* knowledge, obtained by arguing from causes to effects, from *a posteriori* knowledge, obtained from arguing from effects to causes. According to Kant, *a priori* knowledge consists of general, necessary truths, already existing in the mind, independent of experience; *a posteriori* knowledge is empirical, the result of experience, and cannot supply general truths, for experience merely tells us that a thing is, not that it must be as it is. See Philosophy; Logic.

**Apron**. Word of unsettled etymology, probably derived from O.Fr. *napperon*, diminutive of *nappe*, from Lat. *nappa*, a cloth. In the N. of England the form is *nappern*; elsewhere a *napron* was corrupted to an apron. The garment has been in use for centuries. Chaucer mentions a *barme* or lap cloth (A.S. *barm*, lap or bosom), while an old illustration depicts a 14th century smith in a leather apron. In Northumberland the term *barm-skin* survives. Pinner was a name applied when a bib was pinned to the dress; hence *pinafore*. Mary Queen of Scots is said to have left over 100 aprons. Queen Anne and her contemporaries wore aprons with rich embroidery and decoration. The apron of the Anglican bishop is a short cassock, worn in obedience to the 74th canon of Convocation,

1603–4. The symbolic aprons worn by Freemasons are of lamb-skin, and are variously embellished.

In engineering, an apron signifies a protective covering, such as the sloping masonry platform at the foot of a dam, which prevents water from injuring the foundations. In the First Great War balloon aprons were part of the aerial defence of London. The paved embarkation point of an airfield is also called an apron. See Balloon Defences.

**Apron Stage**. Part of a theatre stage which projects into the auditorium. Developed from the Elizabethan platform, this was at first peculiar to the English theatre. Its use died out with



Apron Stage. Modern example of this form of stage at the Memorial Theatre, Stratford-on-Avon

the introduction of the front curtain, but it has been revived in the present century, e.g. at the Maddermarket Theatre, Norwich, and Mercury Theatre, Notting Hill, for production of Elizabethan or Restoration drama.

**Apsaras**. In Hindu mythology, two classes, divine and mundane, of nymphs and fairies. Sometimes as insubstantial cloudy creatures, or as water sprites, they are regarded as Oriental parallels to the swan-maidens of western tradition, or the nymphs of the Greeks. They are also spoken of as nymphs of heaven, attendants on heroes, like the houris of the Mahomedan paradise.

**Apse** (Greek *apsis*, fastening, circle). In ecclesiastical architecture, the semi-circular or polygonal termination of the nave or of the aisles of a basilica. In medieval churches it was the space reserved for the altar, and usually vaulted. Some Norman churches in England have semi-circular apses at the E. end; that in Peterborough Cathedral has fine windows with geometric tracery. One of the transepts at Lincoln has semi-circular



apses to its E. chapels, and the apse of Lichfield Cathedral is a polygon. S. Bartholomew-the-Great, Smithfield, London, and Peterborough cathedral also have apses. The apse was seldom used in English Gothic churches, but there is an example at Westminster Abbey, where the apse itself is surrounded by an ambulatory and a ring of chapels, forming a *chevet*. This arrangement is rare in England, but very common in France. Apses were frequent in Romanesque churches in Continental Europe, and were revived in the Renaissance period. English Renaissance examples include S. Paul's Cathedral, by Wren, and S. Mary-le-Strand, London, 1714-22, by Gibbs.

**Apsheeron.** Peninsula of Azerbaijan S.S.R. extending some 40 m. into the Caspian Sea and forming the E. extremity of the Caucasus Mts. Its volcanic rocks have immensely rich petroleum deposits (see Baku). Apsheeron-Port, on the N.E. shore, was built to relieve pressure on Baku.

Apsheeronsk, a town of Krasnodar Territory, R.S.F.S.R., is a centre of the Black Sea oilfields.

**Apsides.** In astronomy, the aphelion and perihelion points of any body in the solar system. The line of the apsides, therefore, joins the points in the orbits of these bodies when they are respectively farthest from and nearest to the sun, and thus is the major axis of ellipse-like orbits. The term is applied analogously to the components of double stars.

**Apsley House.** Home of the duke of Wellington, which houses the Wellington museum. In Piccadilly, at Hyde Park Corner, it was originally built of red brick by the Adam brothers for Lord Apsley, 1771-78. In 1820 it was presented to the 1st duke of Wellington by the nation, and he had it enlarged and faced with Bath stone. "No. 1, London," as it

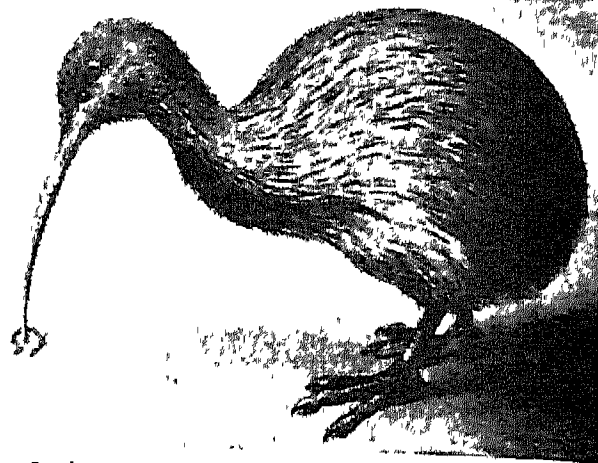
was popularly called, was in 1947 presented by the 7th duke to the nation, on condition that it should continue to be the Wellington home. It contains the duke's personal relics and trophies of war, including a number of famous pictures. In the 90 ft.-long Waterloo gallery he held his Waterloo banquets annually during 1830-52.

**Apt.** Town of France, in the department of Vaucluse. The ancient Apt Julia, it is 40 m. by rly. E. of Avignon, on the Calavon (or Calou), a tributary of the Durance. Apt was formerly the seat of a bishopric. The cathedral of S. Anne dates from the 11th or 12th century. One of the most ancient settlements of the Gauls, Apt was conquered by the Romans, and later included in Provence. An important centre for the working of ochre, it also makes candied fruit, jam, earthenware, and candles, and has flour mills and phosphate works. Truffles are found near by. Pop. (1954) 6,609.

**Aptera.** Archaic name for an order of insects later placed in the sub-class Apterygota (*v.i.*).

**Apterygota.** Sub-class of the Insecta, containing all those insects which are believed to be primitively wingless. It is divided into four orders: Collembola (spring tails), Thysanura (bristle tails), Diplura, and Protura. All winged insects are believed to have had a common ancestry, but the remainder, the apterygotes, contain several lines, although they have in common the insectan characteristics of a head with three pairs of mouth parts, a distinct neck, and a thorax of three segments each with a pair of legs.

**Apteryx.** A genus of ratite birds found only in New Zealand. The native name is kiwi. It has small rudimentary wings, hidden beneath the feathers and useless for flight. The feathers are long, narrow, and simple in character, giving the bird the appearance of being covered with coarse hair. The beak is of great length, and the nostrils are at the tip, a feature found in no other living species of bird. Nocturnal in habit, it is timid and inoffensive. The female lays one egg—rarely two—in a hollow in the ground. The eggs, about 5 ins. by 3 ins.



*Apteryx australis*, or kiwi, a wingless bird found only in New Zealand

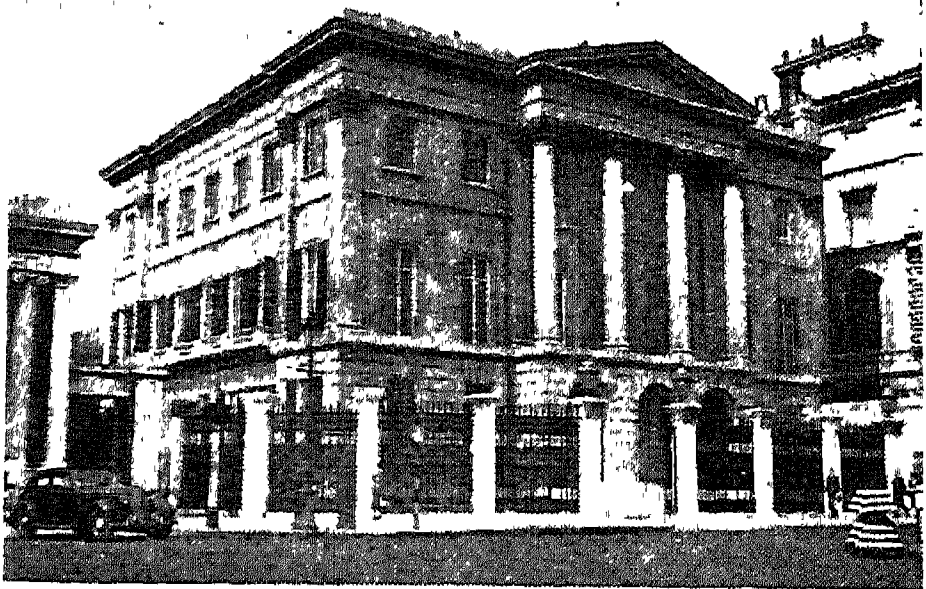
(enormous for a bird no larger than the domestic hen) are hatched by the cock. The bird has become scarce, but is protected by the New Zealand government.

**Apuan Alps.** Outlying range of the Apennines in N.W. Italy. They extend for 30 m. between the main range and the Mediterranean, and contain some of the finest marble in the world. The quarries near Carrara were known to the Romans and are still worked.

**Apuania.** Name given 1935-45 to a municipality formed from the towns of Carrara and Massa, Italy, and to the prov. of Carrara e Massa (*qq.v.*).

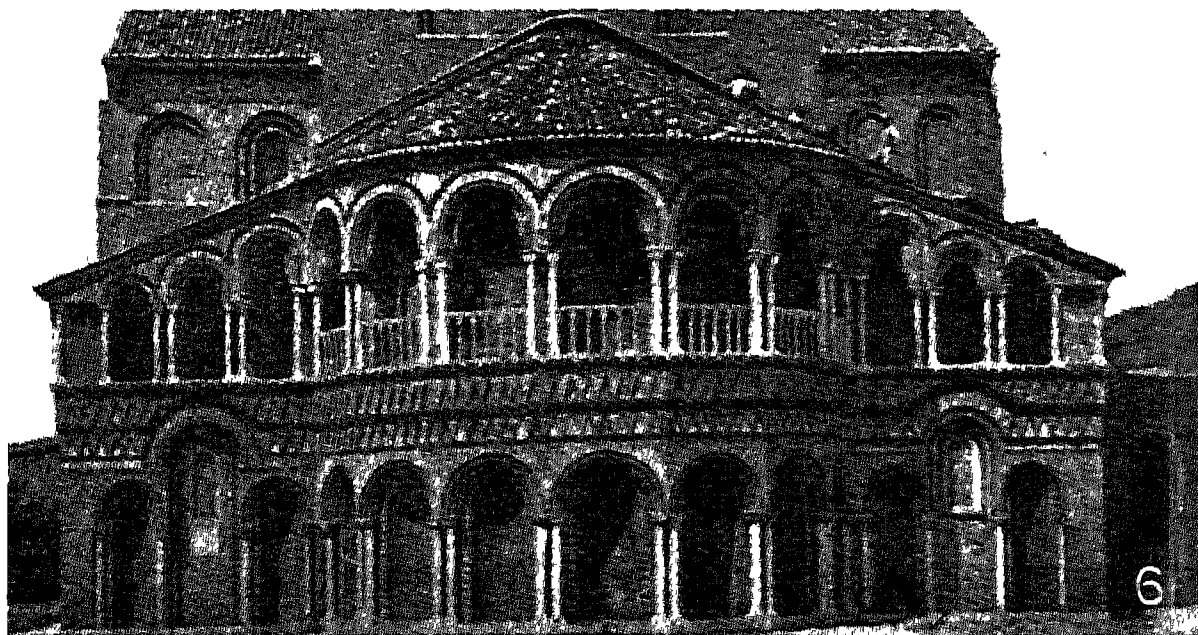
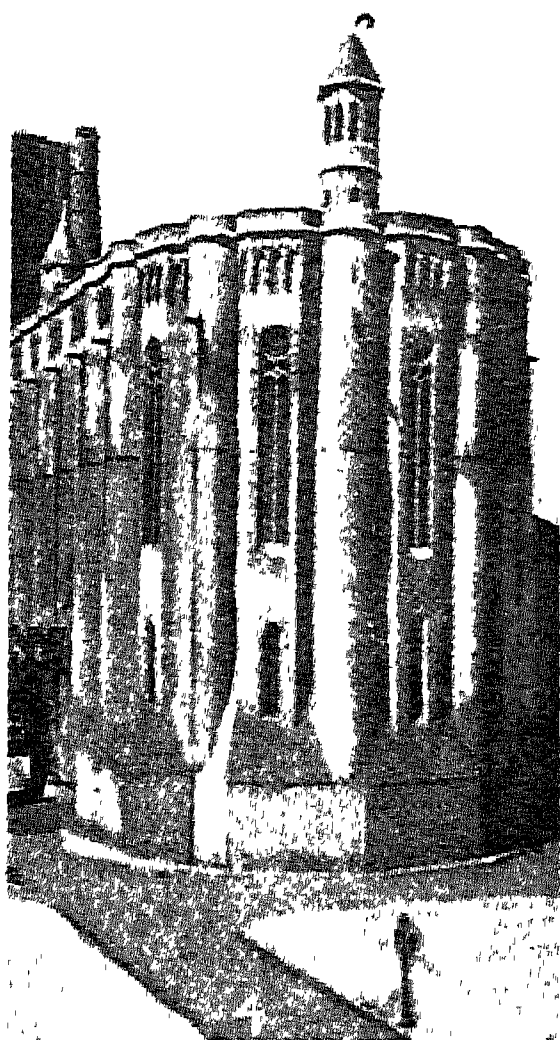
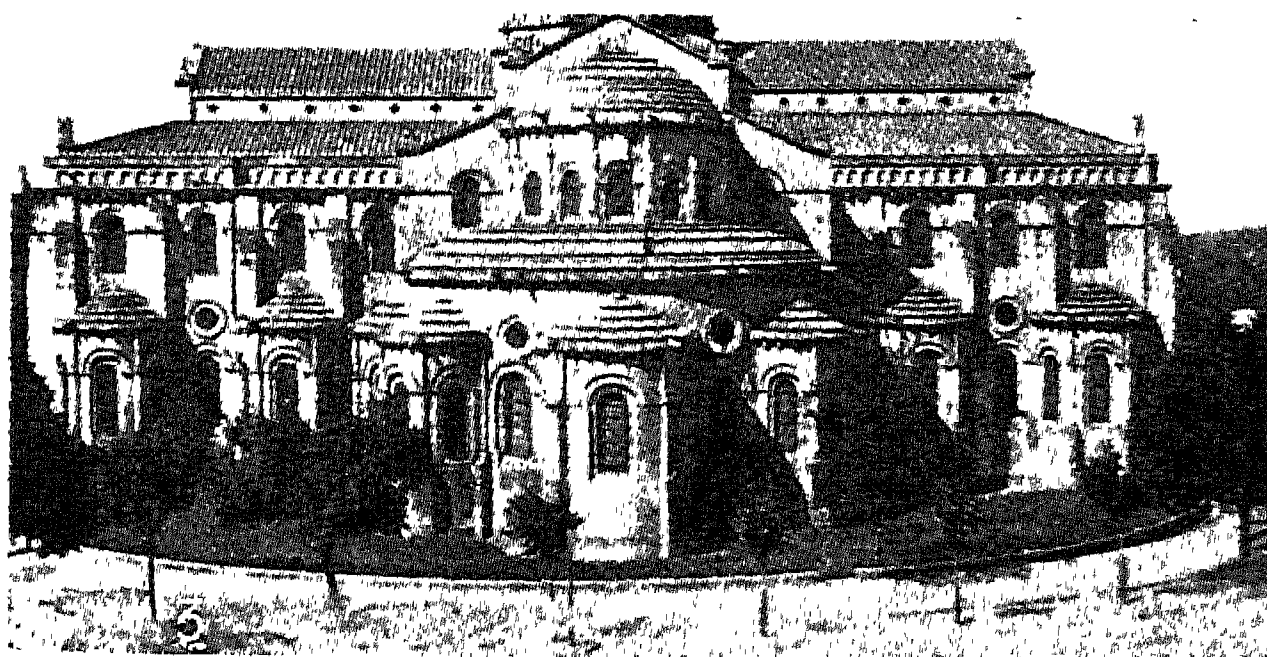
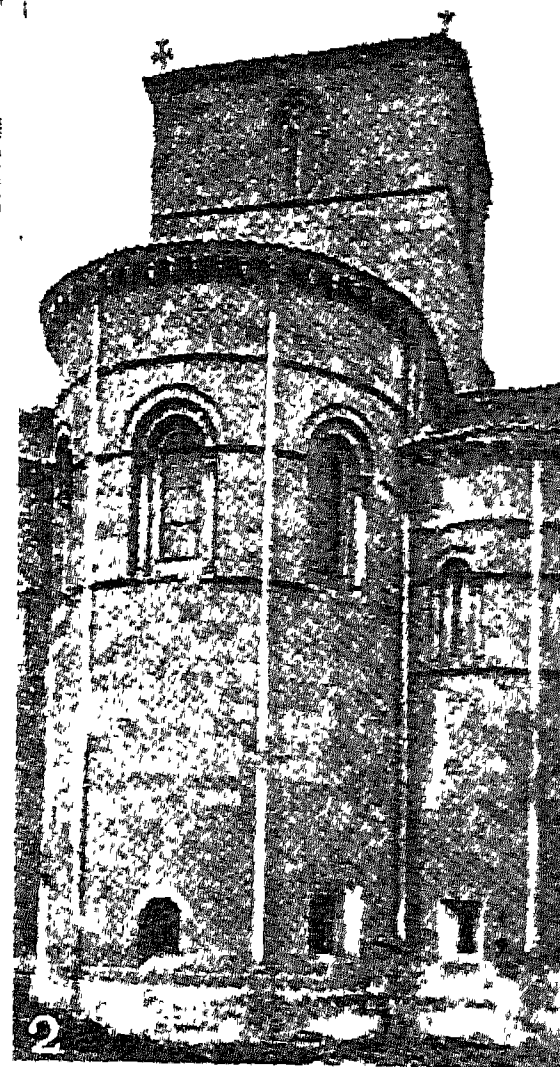
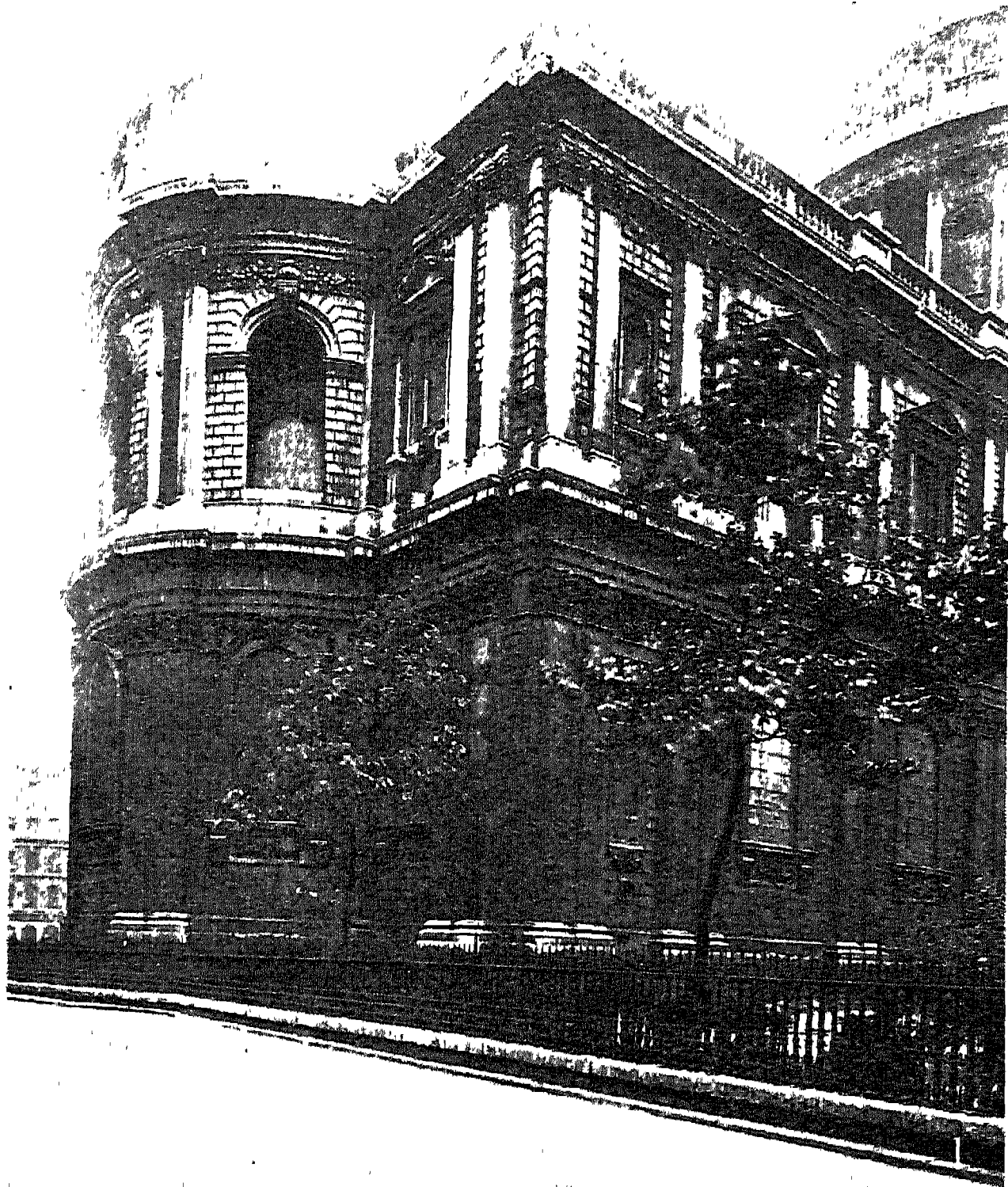
**Apuleius, Lucius** (2nd century A.D.). Roman author. Born c. A.D. 125 at Madaura in N. Africa (mod. Mdaurach, Constantine, Algeria), he travelled extensively before settling as a rhetorician in Carthage. His best known work is *Metamorphoses* or *Asinus aureus* (the golden ass), a prose romance purporting to describe the experiences of one Lucius, whom an enchantress had transformed into an ass. The most famous episode is the story of Cupid and Psyche. *Metamorphoses* is written in African Latin, in the new style which had superseded that of the Augustan age. Apuleius was a student of neo-Platonism, a strong supporter of paganism, and favoured a revival of the ancient mysteries. Some philosophical writings and his defence against a charge of sorcery are also extant. Consult *The Golden Ass*, Eng. trans., W. Adlington, 1566, reprinted 1913; Eng. trans., H. E. Butler, 1910.

**Apulia** (Italian Puglia). Region of S.E. Italy. It includes the provinces of Foggia, Bari, Brindisi, Taranto, and Lecce; area 7,470 sq. m. Bounded E. and N. by the Adriatic, and S.W. by the Gulf of Taranto, it is for the most part a level plain, the highest point being Monte Calvo, 3,464 ft., in the Monte Gargano range. The only large river is the Ofanto, about 100 m. long. The chief industries are pastoral and agricultural. Sheep,



Apsley House, Piccadilly, London. Home of the Duke of Wellington, and of the Wellington Museum





1. Apse of S. Paul's Cathedral, London, one of the finest of the world's Renaissance cathedrals. 2. S. Vicente, Avila, Spain: Romanesque. 3. S. Sernin, Toulouse, France. 4. Cathedral of S. Cecilia, Albi, France; a perfect example

of southern Gothic. 5. Plain Renaissance apse added to the fine 6th-century basilica of S. Apollinaris at Classis, near Ravenna, Italy. 6. The beautiful double-cloistered apse of S. Donatus, Venice; 10th century

#### APSE: EXAMPLES IN ENGLAND, SPAIN, FRANCE, AND ITALY



cattle, horses, and swine are reared; cereals, fruits, tobacco, and wine are produced; marble is worked, and olive oil exported. The chief ports are Bari, Brindisi, Taranto, Barletta, and Gallipoli. Other towns are Andria, Foggia, Corato, Lecce, Molfetta, and Monopoli. Originally civilized by Greek colonists, Apulia submitted to Rome in 317 B.C., and suffered severely in the Punic wars and also in the Social War of 90-88 B.C., after which it never recovered its ancient prosperity. Conquered in 668 by the Langobardi, and in 1043 by the Normans, who made it a duchy, it became part of the Two Sicilies in 1734, of the kingdom of Italy in 1861. Pop. (1951) 3,186,380.

**Apuré.** River of Venezuela. Rising in the Cordillera de Mérida, on the Colombian border, it flows 500 m. N.E. to the Orinoco. It receives the Portuguesa, Guarico, Caparro, and Caucagua, and is navigable for about 350 m.

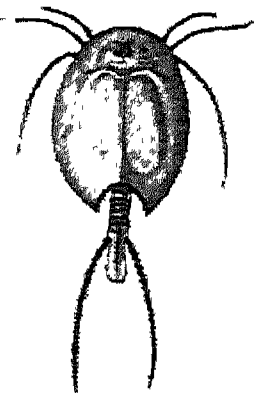
**Apuré.** State in the N.W. of Venezuela. Bounded N. by the states of Barinas and Guarico and S. by Colombia, its main industries are cattle-breeding and exporting hides. San Fernando is the capital. Pop. (1950) 88,939.

**Apurimac.** River of south-central Peru. It rises in the Andes, and flows N.E. and N.W. to the Ucayali, a tributary of the Amazon, of which it is considered a headwater. A turbulent stream, broken by rapids and only partly navigable, it is called the Tambo after its junction with the Perené, and is 600 m. long.

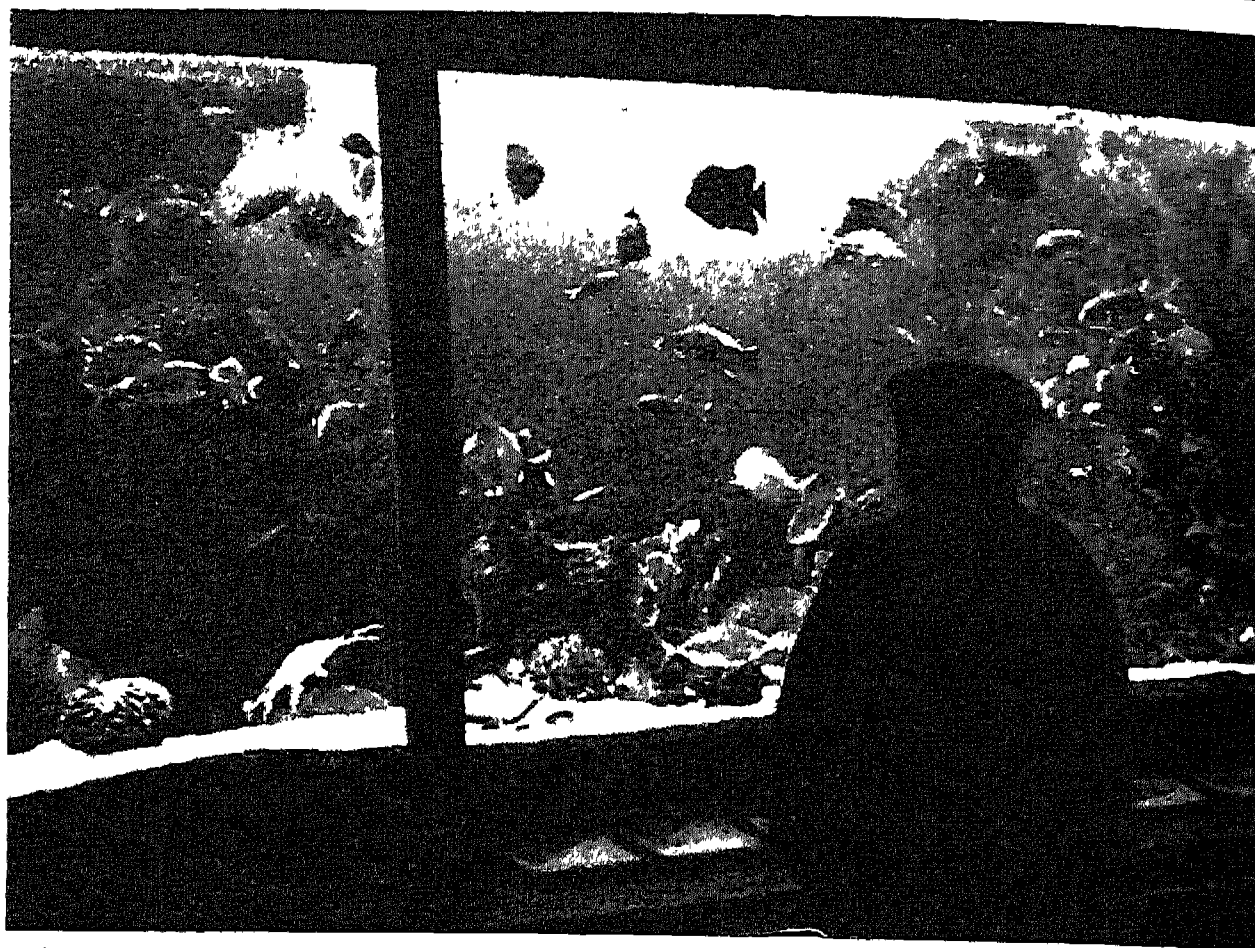
**Apurimac.** Department of south-central Peru. It is watered by the Apurimac and its tributaries, and has an area of 8,187 sq. m. Mainly a plateau, with forests and pastures, it has a wool industry and produces grain, fruit, and sugar-cane. There are gold, copper, lead, and salt mines. The principal towns are Abancay, the capital, and Andahuaylas, about 50 m. to the N.W. Pop. (est.) 336,500.

**Apus.** In astronomy, the Bird of Paradise, one of the constellations of the southern circumpolar stars. See Constellation.

**Apus** (Gr. *apous*, footless). A small fresh-water crustacean of either the genus *Triops* or the genus *Lepidurus* in



**Apus.** *Lepidurus*, or scale-tailed apus (enlarged)



**Aquarium.** In the brilliantly lit tanks of the aquarium at the London Zoo are to be found fish from all the seas of the world

the order Notostraca. It has a comparatively large carapace, covering the head and part of the thorax, the abdominal appendages being exposed. It is often nearly an inch long and swims on its back, the action of the legs resembling that of paddles. The eggs can survive long periods of drought. The one British species is very rare.

*Apus* is also the generic name of a group of birds, the swifts.

**Aquae Sulis.** Roman name for Bath, Somerset, derived from Sul, a local goddess identified by the Romans with Minerva, to whom they built a temple when they founded the watering-place, A.D. 50-60. There are still imposing remains of the Roman baths.

**Aqua fortis** (L., strong water). Ancient and still popular name for nitric acid (*q.v.*). The strongest is called double aqua fortis.

**Aquamarine.** Popular name of the bluish-green varieties of beryl, topaz, and apatite. The word comes from Latin *aqua marina*, sea water, in allusion to the colour, and is also used as an adjective to denote bluish green. The aquamarine is found in the Ural Mts. and in Brazil, the latter country also yielding pretty aquamarine chrysolite of a yellowish-green hue.

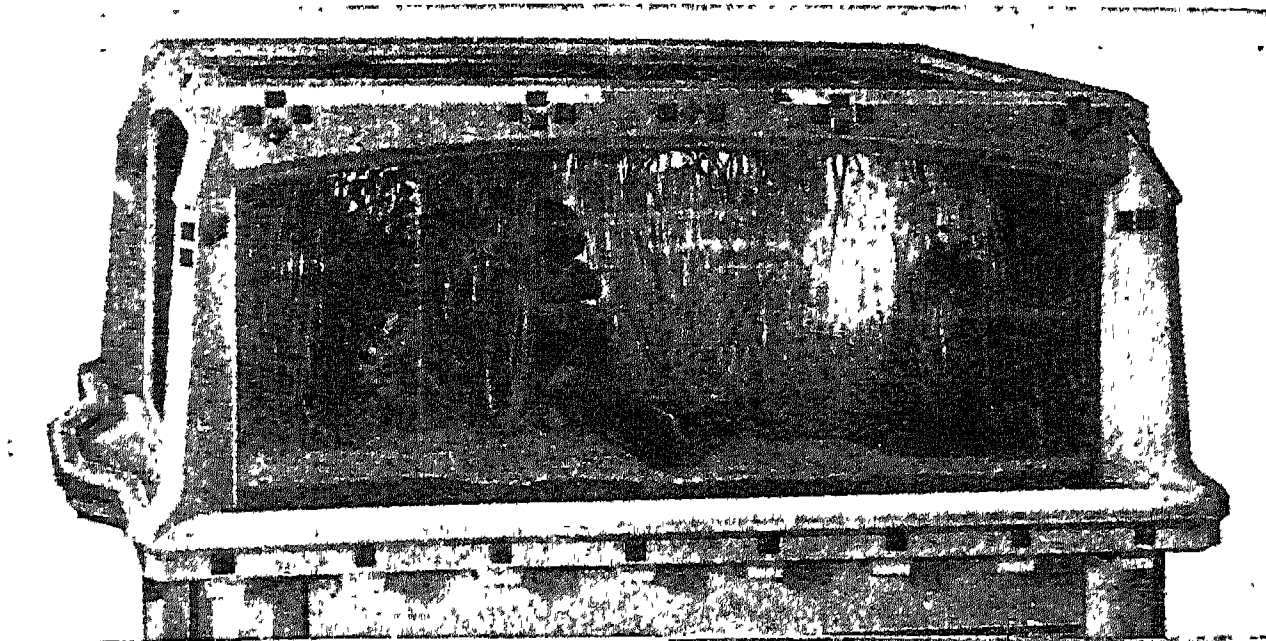
**Aqua regia** (Lat., royal water). A mixture of one volume of nitric acid and four volumes of hydrochloric acid. It was so called because it was found to dissolve gold, the king of metals.

**Aquarelle.** French term for a process of painting with water-colours distinguished from other processes by the translucency of the pigments. As a rule Chinese and process whites are not used.

**Aquarium** (Lat. *aquarius*, pertaining to water). Vessel constructed as a cage in which one can observe living aquatic animals and plants in fresh or salt water. It usually takes the form of a four-sided tank, constructed of glass and slate or of glass and zinc. The best form has the front of plate glass, and the bottom, back, and ends of slate.

Aquatic animals, such as fishes and many insects, respire by extracting the oxygen that is dissolved in the water, and this has to be replaced by the activity of living plants under the influence of sunlight. The animal inhabitants of a tank must never be in too great a proportion to the plants, or insufficient oxygen will be given off to supply their needs, and they will die. Given a proper balance in this respect, there is no need to change the water, unless it becomes fouled by the decomposition of unconsumed food. Fresh water should be added to make up the loss by evaporation. Frogs and newts, which are lung-breathers, and live in water only in the breeding season, should not be admitted to the aquarium. Suitable water plants can be obtained from any dealer. The Canadian pond-weed (*Elodea canadensis*) is one of the best, as it is a quick grower and needs no soil for roots.

Care must be taken to exclude creatures that prey upon others. The large diving-beetle (*Dytiscus*) and all the water-bugs (*Hemiptera*) are of this class, and will soon destroy fishes, tadpoles, and snails. Minute worms, thread-like fragments of raw meat, and crushed vermicelli may be given occasionally



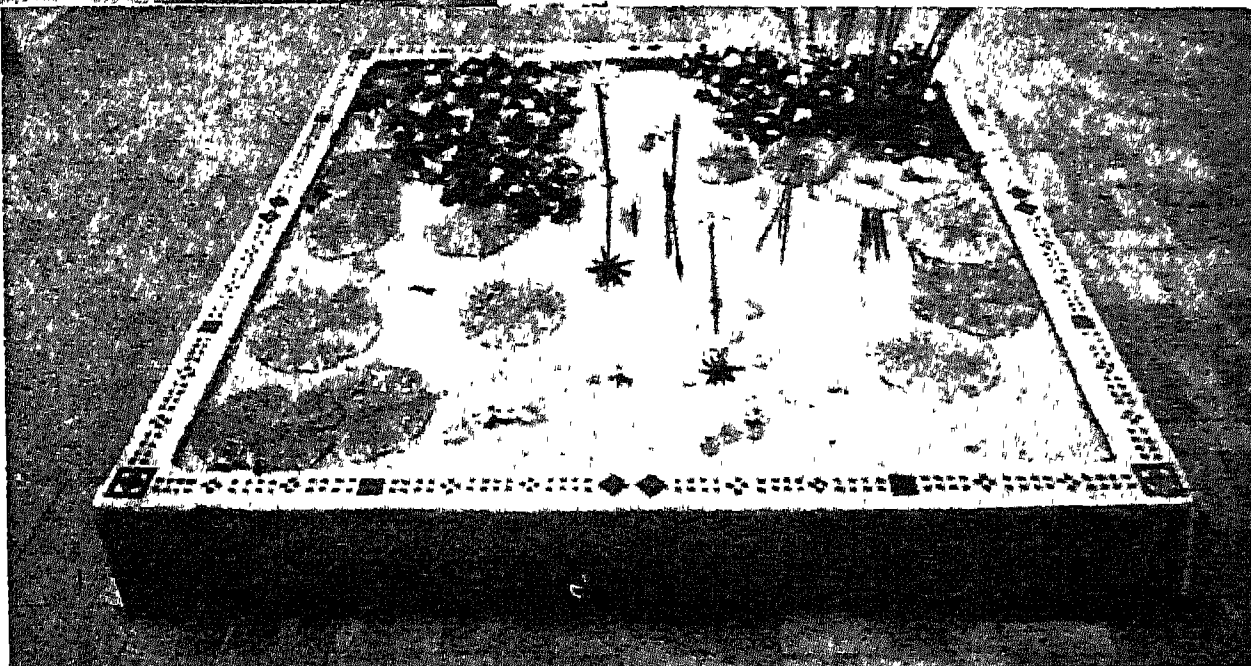
as food; but only in such quantity as can be eaten at once.

The marine aquarium should be filled with sea-water, and a line should be marked on the glass front to indicate the original height of the water. As, owing to evaporation, the water sinks below this line, it should be made good by the addition of fresh water, otherwise it will become too salt. Small green seaweeds attached to pebbles or shells should be sought on the shore for removal to the aquarium; the brown or olive wracks are unsuitable for the purpose. Sea-anemones, zoophytes, shrimps, small crabs, molluscs, and a few of the smaller species of shore-haunting fishes are the most suitable inmates; and morsels of raw fish should be given as food. If any dead or decaying matter is at once removed, such an aquarium may be maintained without change of water for months. If far from the coast, provision for a change of water should be made at the beginning by obtaining a cask of sea-water equal to about four times the capacity of the tank. Should a change become necessary, draw off the whole of the water from the aquarium by means of a siphon, and refill from the store cask. Then carefully strain the foul water through two or three thicknesses of fine muslin, and pour it into the store cask. By admixture with the greater volume of water still left, and by being kept in the dark, the fouled water will soon become wholesome again.

Exhibition aquariums of large size have become increasingly popular with the public. Famous examples are at Monaco, Brighton, the London Zoo, and in New York, Boston, San Francisco, Washington, and New Orleans.

**Aquarius.** One of the oldest constellations. The name signifies the water-bearer. Its place in the heavens is indicated by the lines:

Down from bright Vega cast your glance across the Dolphin's space,  
Then just as far again you'll find the Water-bearer's place.



Aquarium. Open-air tank form, made of reinforced concrete; and (above) a handsome form of stand aquarium

From time immemorial the constellation has been represented as a man pouring out a stream of water from a pitcher, apparently on Pisces, the Fish. The water-bearer's right arm is stretched backwards so as to reach over almost the entire length of Capricornus. The stream of water trickles down to the star Fomalhaut, one of the four ancient royal stars and the mouth of the Fish. See Constellations: Zodiac.

**Aquatint** (Latin *aqua tincta*, dyed water). The name applied to a mode of etching on copper with a resin ground resulting in resemblances to flat washes of water-colour in monochrome. Aquatints were first produced in France by Leprince, 1750, and in England by Paul Sandby 1775. See Etching.

**Aqua Tofana.** Poison reputed to have been used in Italy in the 17th century. It was most probably a solution of arsenic, and was said to be a tasteless and odourless liquid, a few drops being sufficient to bring about death. The name is supposed to be derived from a Sicilian woman who first prepared it.

**Aquaviva.** Variant spelling of the name of the Jesuit general, Acquaviva (q.v.).

**Aqueduct** (Lat. *aquae ductus*, conveyance of water). Conduit in which water flows or is conveyed from one point to another. Actually

a water pipe or a canal fulfils this condition, but in the generally accepted sense of the word an aqueduct is an artificial channel in which water intended for domestic, power, or other purposes flows by gravity, at least for a considerable portion of the distance, between the source of supply and the destination. In modern practice detached sections of aqueducts proper are often conducted by pipe line sections and siphons.

The most famous builders of aqueducts were the Romans, and

many of the ruins of their structures exist in Italy and elsewhere on the Continent. Aqueducts brought water to Rome from the Alban and Apennine hills, but especially from the springs of Tivoli. One of these ancient waterways was the Anio Vetus, begun by M. Curius Dentatus about 273 B.C. It measured approximately 71,000 yds. in length.

The oldest Roman aqueduct was that of Appius Claudius, which dates from about 310 B.C. This conveyed the Aqua Appia to Rome over a distance of some 19,000 yds. Both these aqueducts had fallen into disuse by 150 B.C. It was then that the conduit for the Aqua Marcia was brought to Rome from Subiaco, some 20 m. beyond Tivoli. During the reign of Agrippa all the aqueducts were restored, and the later emperors added the Aqua Claudia and the Anio Novus. The height of some of the arches was about 100 ft.

A notable Roman aqueduct is that of Segovia in Spain. It begins in the Sierra Guadarrama, 10 m. distant, and, after traversing the intervening hills and dales, crosses the streets of the city to the Alcazar. It is built of great blocks of granite, without mortar or clamps, and its arches vary from 23 ft. to 94 ft. in height. Dating from the time of Trajan, it was restored by Queen Isabella of Spain in the 15th

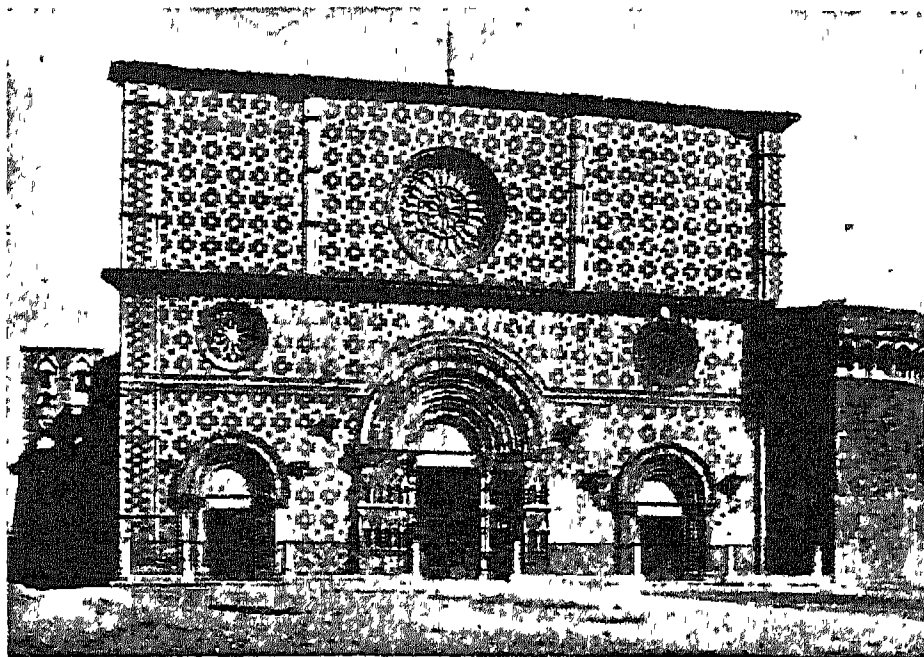


century. There are also ruins of important aqueducts at Metz and at Nîmes. Other Roman aqueducts are to be found at Tarragona, Lyons, Fréjus, and Luynes. The Roman structures were mostly built of stone, but bricks and concrete appear to have been used. Roman aqueducts followed a uniform slope throughout, the water flowing by gravity.

The picture on this page shows a bridge-like structure used to carry the Birmingham aqueduct over Deepwood bridge: in modern practice, however, the original type of aqueduct has for most purposes been superseded by the use of pipes, which are now usually of cast iron or steel, or by closed conduits constructed of reinforced concrete. In some cases, however, where the natural slope of the ground permits of the requisite fall, a trench is dug, an inverted arch of concrete is formed on the bottom, side walls are raised on this, and an arched roof is added to exclude polluting matter. The trench is then covered with the excavated earth, which affords protection from heat and cold.

Tunnels are used where the watercourse has to go through an elevation or underneath a river. In the Lake Vyrnwy scheme for supplying water to Liverpool a tunnel 7 ft. in diameter and 3½ m. long forms part of the 68-mile course of the aqueduct.

Much larger and longer tunnels have been driven for some of the American aqueducts. The Delaware aqueduct (completed 1942) brings additional water from tributaries of the Delaware river to New York, already supplied in part since 1917 by the Catskill aqueduct, 126 m. long. In the Delaware scheme a single tunnel, from 17 to 19 ft. in diameter and 15 m. long, pierces the Shawangunk mt. Three shafts, 840, 825, and 1,551 ft. deep, were



Aquila, Italy. The 13th century façade of the church of S. Maria di Collemaggio

sunk at points 5 m. apart, in order to allow of simultaneous tunneling at a number of points. Rock tunnels are usually concreted to promote ease of flow: earth tunnels are concreted or bricked for the same reason. In undulating country and across valleys, sections of steel pipe-line are interposed.

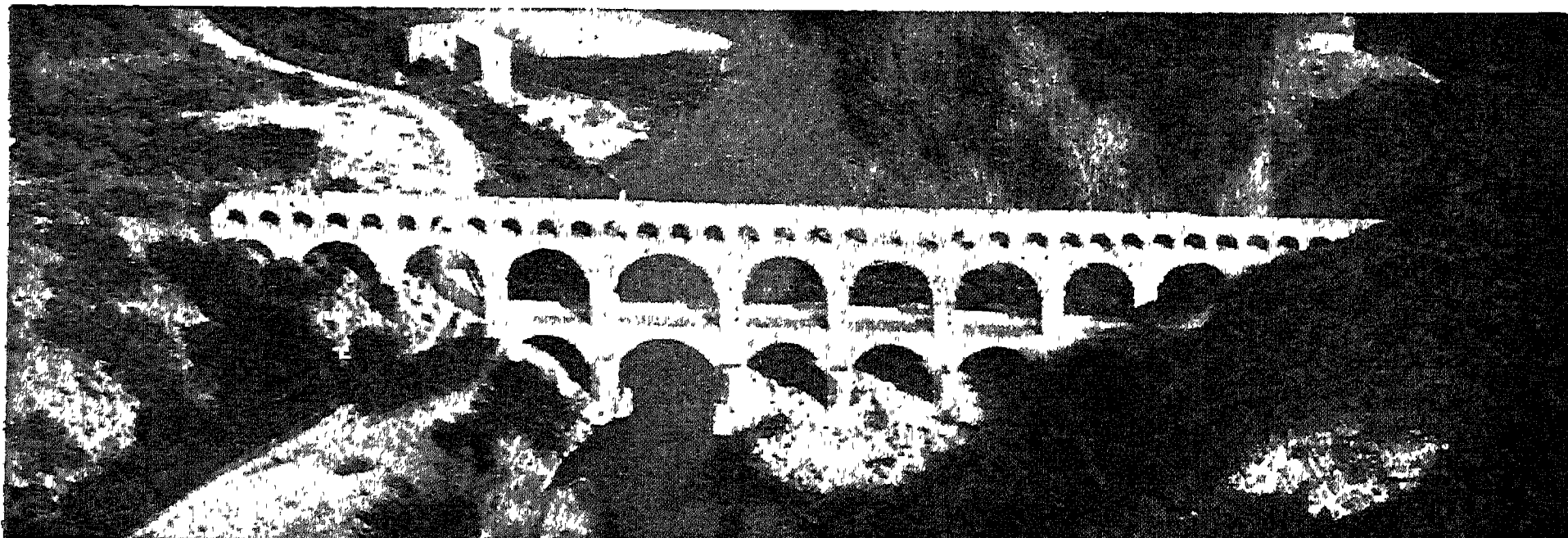
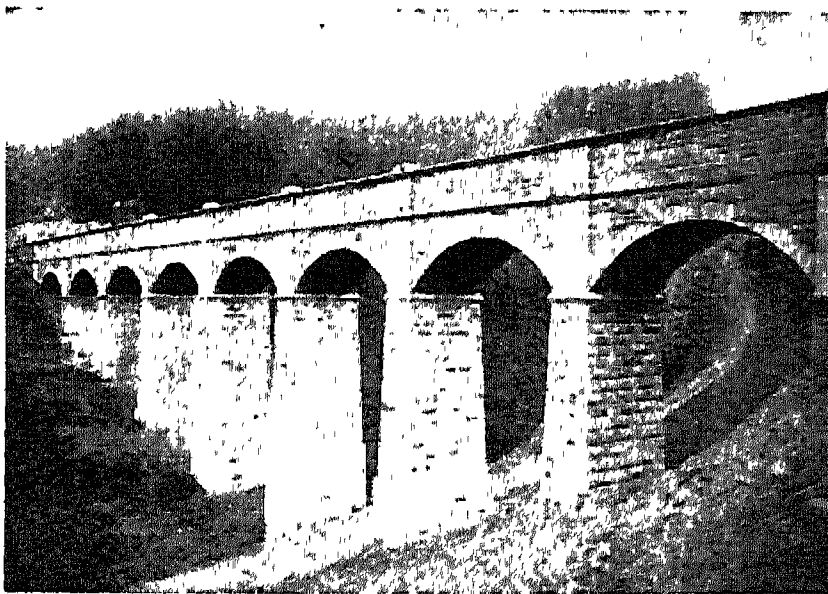
**Aquifoliaceae.** Small family of shrubs or trees having undivided, alternate, and often evergreen leaves. The flowers are small and white, in clusters (cymes) produced from between the base of the leaf-stalk and the twig. There are only five genera and about 300 species, natives of tropical and temperate regions. The common holly is a well-known type.

**Aquila** (Ital. L'Aquila). City of Italy, capital of Aquila province. It is on the Aterno, 50 m. direct and 145 m. by rly. N.E. of Rome. It is a summer resort, beautifully situated on a plateau at the foot of the Gran Sasso d'Italia. An archiepiscopal see, it has a 13th-century cathedral and a citadel built by the Spaniards in 1534. Notable among

its churches are S. Bernardino di Siena, dating from 1472, and containing a finely sculptured tomb of the saint, and that of S. Maria di Collemaggio, built 1280, within which is the tomb of Pope Celestine V. Its chief industry is lace-making. It was founded by the emperor Frederick II about 1240. Razed by Manfred

twenty years later, it suffered further at the hands of the Spaniards in 1529 and the French in 1799. During the Second Great War, the city suffered no damage; it was occupied by the Allied 8th army June 14, 1944. Pop. (1951) city, 55,277; prov., 344,911.

**Aquila** (Lat., eagle). Name of a constellation in the northern hemisphere. Figured as an eagle carrying a harp about its neck, it is to the east of the star Vega and is traversed by a bright part of the Milky Way, which here divides into two branches. Its chief star is Altair, occupying one of the angles of an equilateral triangle, the other two points being Vega and the star Alpha Ophiuchi. See Constellation.



Aqueduct. Air view of the Pont du Gard (c. 18 B.C.) carrying the aqueduct that supplied Nîmes, France across the valley of the R. Gard. Above right, Deepwood Dingle crossing of the Birmingham aqueduct

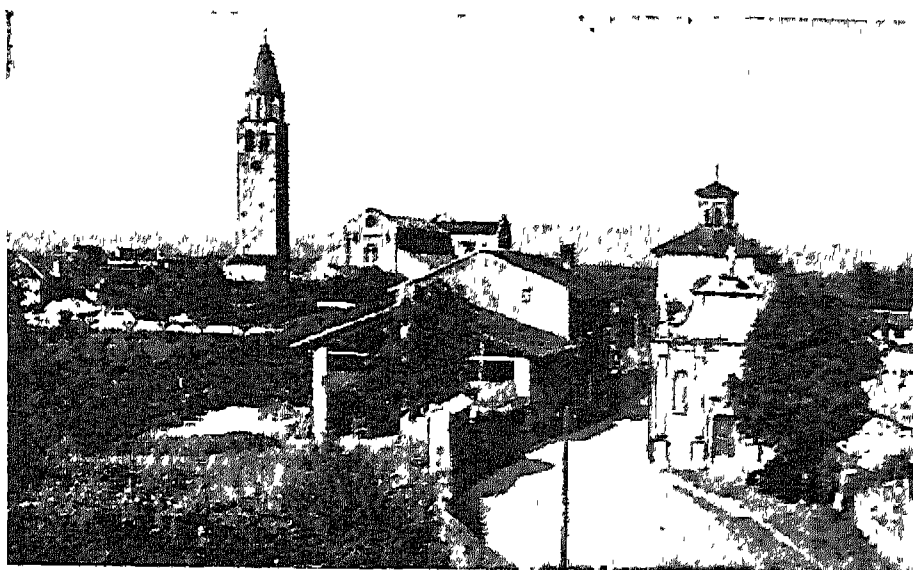
**Aquila.** An early convert to Christianity mentioned in the N.T. The husband of Priscilla, with whom he is always associated, he is referred to by Paul (Rom. 16, v. 3; 1 Cor. 16, v. 19; 2 Tim. 4). Born in Pontus (Acts 18, v. 2) and a Jew, Aquila was driven from Rome, and with Priscilla entertained Paul at Corinth. Later they saved the life of the apostle at Ephesus. A late tradition makes Aquila one of the 70 sent out by Christ.

**Aquila** (2nd century A.D.). Author of a Greek translation of the Hebrew scriptures. A native of Pontus in Asia Minor and related to the Roman emperor Hadrian by marriage, he was put in charge of the rebuilding of Jerusalem. There he was converted to Christianity, but was later excommunicated and became a proselyte to Judaism. Subsequently he made his translation, which is characterised by extreme literalness, to the extent of being a key to the Hebrew rather than a Greek literary work. It survives only in fragments, of which some were discovered as late as 1897 in Cairo.

**Aquilegia.** Genus of perennial herbs of the family Ranunculaceae, containing a few species and numerous hybrids, native to the N. temperate zone. The compound leaves have the main leaflets divided into three lobes. A familiar example is the common columbine or granny's bonnet (*A. vulgaris*), native to Europe, Asia, and N. Africa, whose inverted flower is supposed to resemble a nest of five doves (Lat. *columbae*) or eagles (*aquilae*).

**Aquileia.** Small town of Italy, in Udine prov. In the Middle Ages it was called Aglar. It stands N.W. of Trieste, 6 m. from the Adriatic Sea. From its foundation as a frontier fortress in 181 B.C. until its destruction by Attila in A.D. 452, Aquileia was one of the great cities of the Roman Empire, especially under the successors of Augustus. Then lying on the sea (which has retreated), it was the nodal point of several roads, a station of the fleet, a residence of the emperors, and an important trading centre. At the close of the 4th century it was the ninth city of the Roman Empire.

The bishop of Aquileia attained the rank of patriarch and was one of the most important dignitaries of the medieval Church. The archbishopric existed in what remained of the city after its destruction in 452, and, although once or twice



Aquileia, Italy, showing the 11th-century cathedral and its lofty campanile, 240 ft. high

removed, was not suppressed until 1751. The cathedral, dating from the 11th century, occupies the site of an earlier edifice. It was remodelled in the Gothic style about 1380, and has a campanile 240 ft. high.

Aquileia was included for centuries in the Holy Roman Empire, and was acquired by Austria in 1806 and by Italy after the First Great War. Councils of the Church were held at Aquileia in 381, 558, 698, and 1184. Parts of its ancient walls have been excavated and a few fragments remain of the imperial palace built during the 4th century. Pop. (1951) 3,549.

**Aquinas, THOMAS** (c. 1225-74). Saint and theologian. A son of the Count of Aquino, he was born in the family castle at Roccasecca, near Naples, and brought up at the Benedictine abbey of Monte Cassino. At the age of 13 he was a student at the university of Naples. Here three years later he became a friar of the Dominican order, notwithstanding the opposition of his family, and, proceeding to Cologne, attended the classes of Albertus Magnus, with whom he was sent to Paris for a three years' course at the university. He returned to Cologne, and was ordained to the priesthood, lecturing and teaching in that city until c. 1252.

When in 1252 Thomas went to Paris to take his doctor's degree, his fame as a theologian and a teacher was already established. But Paris was the scene of bitter controversy between the friars and the secular clergy, and the friars, heavily attacked by the latter, called Thomas and Bonaventura the Franciscan to their assistance. The cause was argued before the pope, and Thomas's brilliant defence broke up completely the case against the mendicant orders. Thomas received the doctorate in theology in 1257. From that time until his death he was teaching, writing, and regulating the theo-

logical studies of the Dominican friars. Beyond attendance in London at a general chapter of the order in 1263, and two years in Paris, 1269-71, he remained in Italy—at Rome, Bologna, and Naples—refusing all high appointments in the Church, and re-

maining a simple friar. Summoned by Pope Gregory X to attend the general council called at Lyons for the reunion of the Greek and Latin churches, he died at the Cistercian abbey of Fossa Nuova, March 7, 1274. He was canonised by Pope John XXII in 1323, and declared a doctor of the Church in 1567, and patron saint of all Catholic schools and colleges. His festival is kept on March 7.

The influence which Thomas Aquinas has exercised on both theological and philosophical thought is enormous. His learning was wide and deep and his intellect brought every branch of knowledge within his system of theology. In addition to several commentaries on books of the Bible, a philosophical treatise on being and essence, a summary of philosophy, and commentaries on Aristotle, there remains the greatest of all his works, the *Summa Theologica*, a compendium of all human knowledge in its relation to religion.

In this work Aquinas taught that for the human soul there were two sources of knowledge, divine revelation (supernatural) and human intellect (natural); and that all knowledge begins with the senses. Philosophical, i.e. natural, knowledge could be brought to its fullness only by broadening into theology under the grace of divine revelation. The intellect discerning the good determines the will, which is thus dependent on the intellect; freedom is simply the liberty based on knowledge. Without knowledge of justice the will is not free to choose the just course. Theology, Aquinas taught, is organized knowledge of God. While reason can prove the existence of God, revelation shows the essence of God. The divine will is bound to the divine wisdom, and a thing does not become good because God wills it; He wills it because His wisdom recognizes that it is good. It follows that true doctrine is



the cause and basis of all right practice, and that the intellectual appreciation of God—that is, knowledge proceeding from divine revelation—is all-important.

Aquinas was greatly indebted to Aristotle, in agreement with whom he maintains that ethics is the science of directing the will to the real good; but he makes charity or love the central unity of the virtues. Aquinas was a man of exceptional religious fervour and of simple piety. In 1263 the festival in honour of the Holy Eucharist was, at the request of Aquinas, made by Pope Urban IV a feast to be observed throughout the Catholic Church, under the title of Corpus Christi. Thomas was deputed by the pope to compile the office for the festival, and his work includes the three greatest and best known hymns in honour of the Sacrament—*Lauda Sion*, *Verbum Supernum*, and *Pange Lingua*. All three in English translations are often used at Holy Communion in the Anglican church.

**Bibliography.** Summa Theologica, 22 vols., 1909–22; Summa Contra Gentiles, 5 vols., 1924–29; Thomas Aquinas, His Personality and Thought, M. Grabmann, 1928; The Philosophy of St. Thomas Aquinas, E. Gilson, 1937; Lives, M. C. D'Arcy, 1930; G. K. Chesterton, 1933.

**Aquino.** Town of Italy, in the province of Frosinone. An important centre of the Volsci, it was destroyed by the Lombards in the 6th century and never recovered its old importance; many Roman remains survive. The Benedictine church of Santa Maria della Libera was built on the foundations of a Roman temple. During the 11th–13th centuries Aquino belonged to the Lombard family, a member of which was Thomas Aquinas (*v.s.*), born at the castle of Roccasecca near by. Pop. (1951) 3,581.

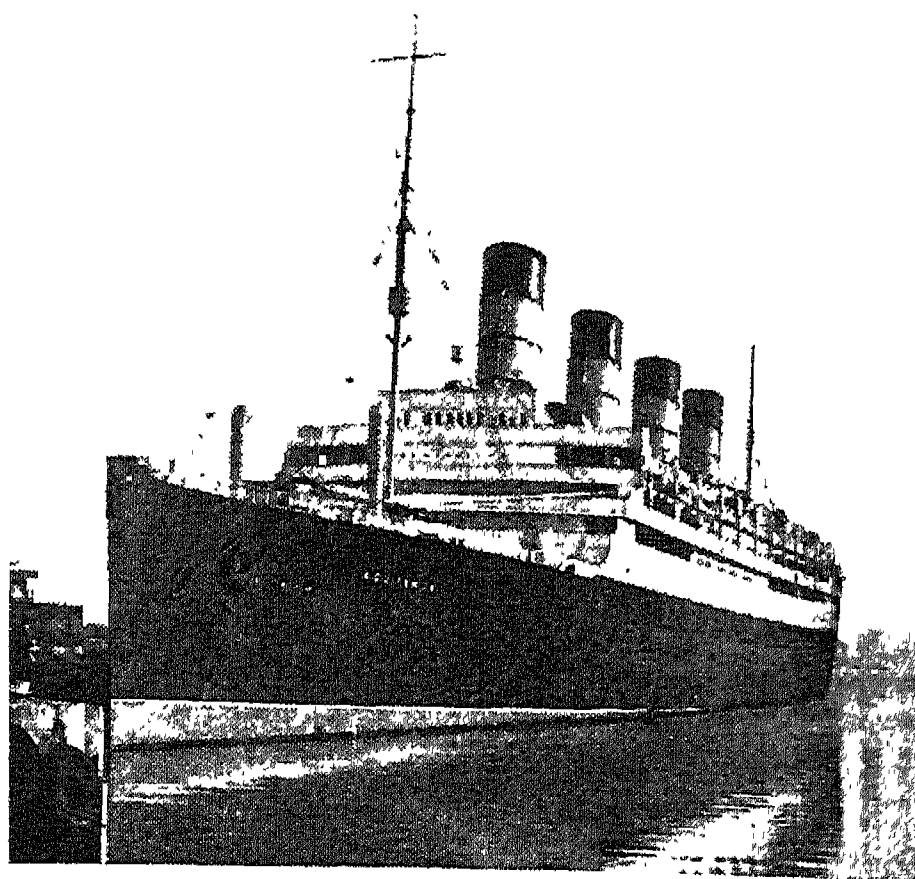
**Aquitaine** (Lat. Aquitania, country of waters). Name given nearly 2,000 years ago to the district between the Pyrenees and the river Garonne. Gradually the name spread farther N., and in the time of Augustus Aquitania reached as far as the Loire. After the fall of the Western Empire Aquitania was ruled by dukes, who were in practice independent, although nominally vassals of the Frankish kings. Charles Martel recovered it, and Charlemagne gave it to one of his sons. In the

9th century a new line of dukes obtained authority over it. One of these, William, had a daughter Eleanor, who was the wife, first, of Louis VII of France, and, second, of Henry II of England (by whom she was the mother of Richard Coeur de Lion). She was the heiress of Aquitaine, which thus came into the possession of the kings of England until the days of Henry VI. The north part became the province of Guienne (which name is a corruption of Aquitaine); the south part became the province of Gascony.

**Aquitania.** Former Cunard liner. Launched in 1913, scrapped in 1950, she had a gross tonnage of 45,647 on a length of 868 feet. Her speed was 24 knots. Taken over as an armed cruiser at the outbreak of the First Great War, she was subsequently a transport and hospital ship. Between the wars she made 291 crossings of the north Atlantic. In the Second Great War she again served as a troop transport.

**Ara** (the altar). Constellation of the southern hemisphere, one of those listed by Ptolemy. See Constellation.

**Arabah, Wady el.** Valley dividing Jordan from Israel. Sometimes called El Ghor, it stretches from the southern end of the Dead Sea to the northern end of the Gulf of Akaba, and is about 110 m. long. It is part of the Great Rift Valley which connects the Dead and Red Seas with Lake Tanganyika. On the east is Mt. Seir. The valley



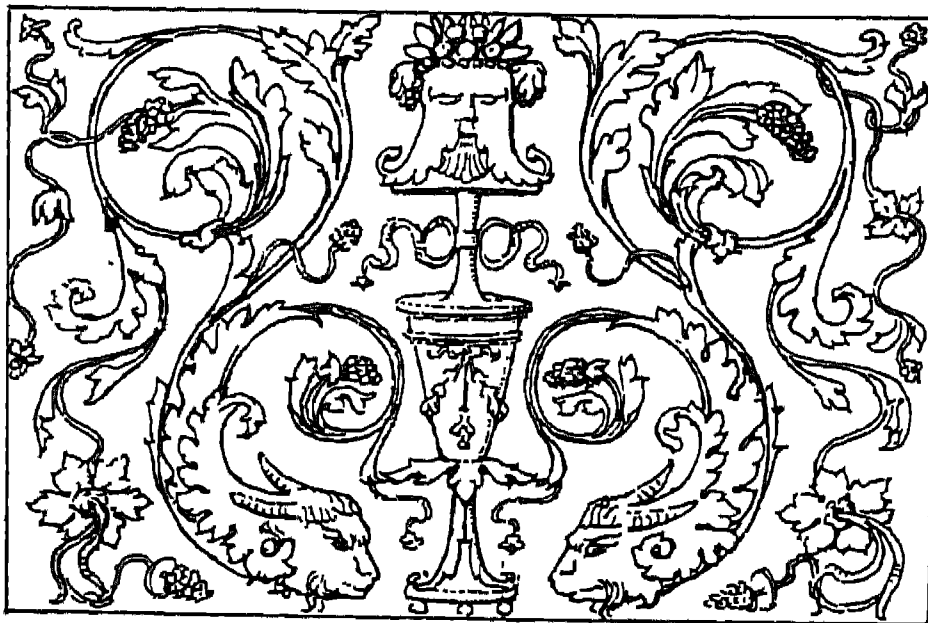
**Aquitania.** Cunard liner launched in 1913, scrapped in 1950. She sailed chiefly on the north Atlantic service

covers the district of Edom in ancient Palestine.

**Arab Architecture** OR ARABIAN ARCHITECTURE. Name formerly applied to Mahomedan Architecture (*q.v.*). Before the time of Mahomet the Arabs possessed no architecture of their own, and even when they overran Egypt, Syria, and Persia they relied on Byzantine and Persian workmen for their buildings, so that the so-called Arab architecture in these countries was not evolved from purely Arab inspiration.

**Arabesque.** In architecture, term used to describe decorative panels containing grotesque features, animal forms, and other elements, symmetrically disposed, and linked together by scrolls and foliage. This form of ornament was not derived from "Arab" (*i.e.* Muslim) sources, as was believed when the term was coined in the 17th century, but from ancient Greco-Roman examples at Pompeii and elsewhere, which were followed by Raphael and his fellow artists of the *cinquecento*. Islamic law prohibited the use of human, animal, or naturalistic forms in ornament, which was thus restricted to interlacing patterns of strictly abstract type completely different in character from Italian and other arabesques of the Renaissance.

In music, the word arabesque denotes a flourish. Schumann first used it as the title for his well-known pianoforte piece (*op. 18*), and Debussy wrote several arabesques for piano.



**Arabesque,** carved in marble, from the church of Santa Maria dei Miracoli, Venice, 1480–89

**Arabi**, AHMED (c. 1839–1911). Egyptian soldier and rebel, defeated at Tel-el-Kebir. Born in Lower Egypt of fellah parents, he became an army officer in 1862, shortly afterwards joining a secret society for the overthrow of the khedive. He won popularity in the army by his speeches against the employment of foreigners and Turkish ministers in Egypt, and in 1882 forced himself upon the khedive, Tewfik Pasha, being created a pasha and made war minister. His influence soon

dominated Egyptian affairs, and his hostility to all forms of European control led to the Alexandria riots of June 11, 1882, and to his open rebellion. The British bombarded Alexandria on July 11, and on the night of Sept. 12–13 Sir Garnet Wolseley's forces defeated Arabi Pasha at the battle of Tel-el-Kebir. Arabi surrendered and was condemned to death, a sentence commuted to perpetual exile in Ceylon. Permitted to return to Egypt in 1901, he died there Sept. 21, 1911.

the other Yoktanic or Kahtanic in the S.; both are Semitic. In the world movements from E. to W. or from W. to E., no great armies ever traversed Arabia, and no vast migrations of peoples dropped settlers by the way. The Arabs in the S. consider their blood the purer. Roughly all are divided into two great classes—the Beduin or migratory Arabs, who move under tribal chiefs from oasis to oasis; and the Arabs who live in settled communities in Nejd, Shammar, and along the coast under independent or semi-independent princes. Intimate relations have persisted through the centuries between Arabia and the peoples of the Levant coastlands. There are many Jews, especially in S. Arabia. Pop. (est. 1955) 10,735,000.

**POLITICAL DIVISIONS.** The most important political division is the kingdom of Saudi Arabia, which includes the Hejaz, Asir, and the great interior mass of Nejd. For the most part this is mountainous or plateau country, arid and

## ARABIA: LAND OF DESERT AND OIL

*In this article are sketched the geography, art, philosophy, language, etc., of the Arabian peninsula, as well as its history, with its renewed political importance owing to its petroleum wealth. For further information see under Hejaz; Mahomedanism; Mecca; Nejd; Yemen, etc.*

Arabia is a peninsula of S.W. Asia, called in Arabic Jezirat-al-Arab, the peninsula of Arabia. Its northern boundary, not precisely defined to the E., runs from the head of the Gulf of Akaba to the Persian Gulf, and touches Jordan, Iraq, and Kuwait. On the W. Arabia is bounded by the Red Sea, E. by the Persian Gulf and Gulf of Oman, and S. by the Gulf of Aden, the Arabian Sea, and the Indian Ocean. Its area is 947,200 sq. m., about half of which is uninhabitable. From N.W. to S.E. it is about 1,800 m. in length. It is broadest on the S., its mean breadth being about 600 m. Vast portions are sandy wastes.

The mountain rim on the W. and the encircling deserts N., E., and S. isolate the central tableland of Nejd and Shammar; here are many hillocks and few hills. In the N., in Jebel Shammar, where the rock is granite, there are few oases; in the S.E. the limestone is more fertile and better watered; in the sandstone between the two is the comparatively fertile valley of Kasim. Throughout Nejd water can be obtained by digging, so that the area supports a relatively large population. Of the rivers no single stream flows all the year round.

Except in the north-central regions, inhabited Arabia consists of a series of more or less well defined

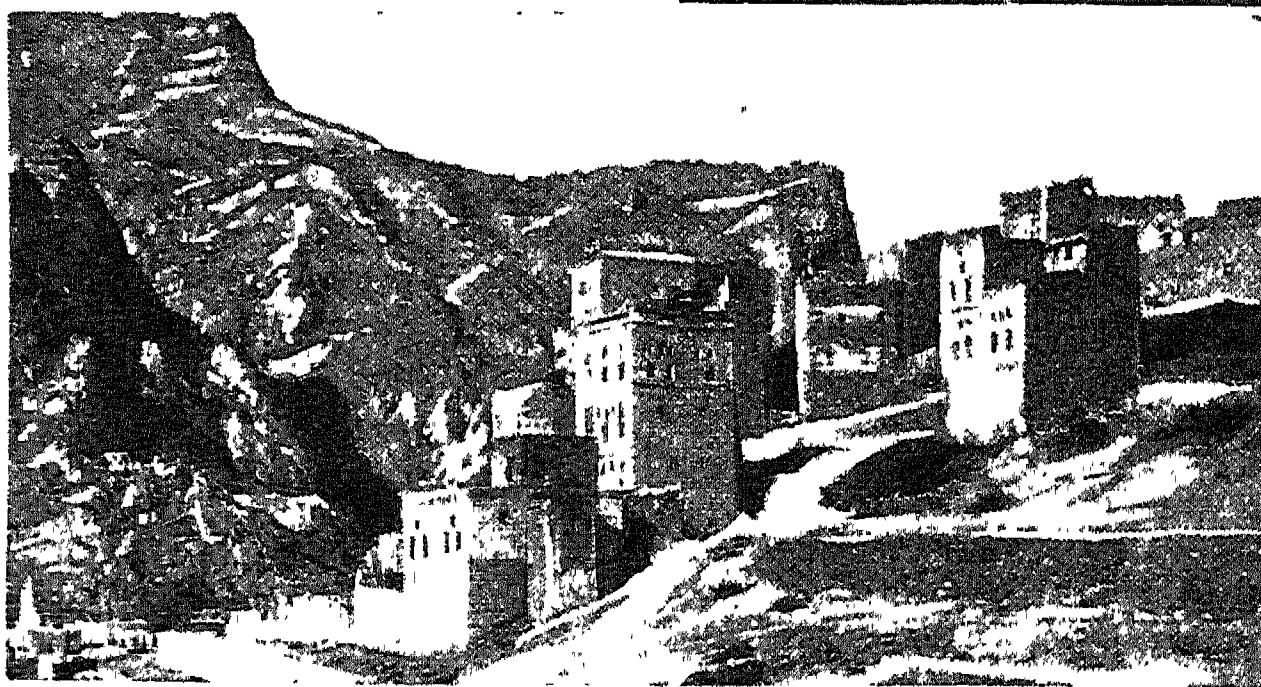
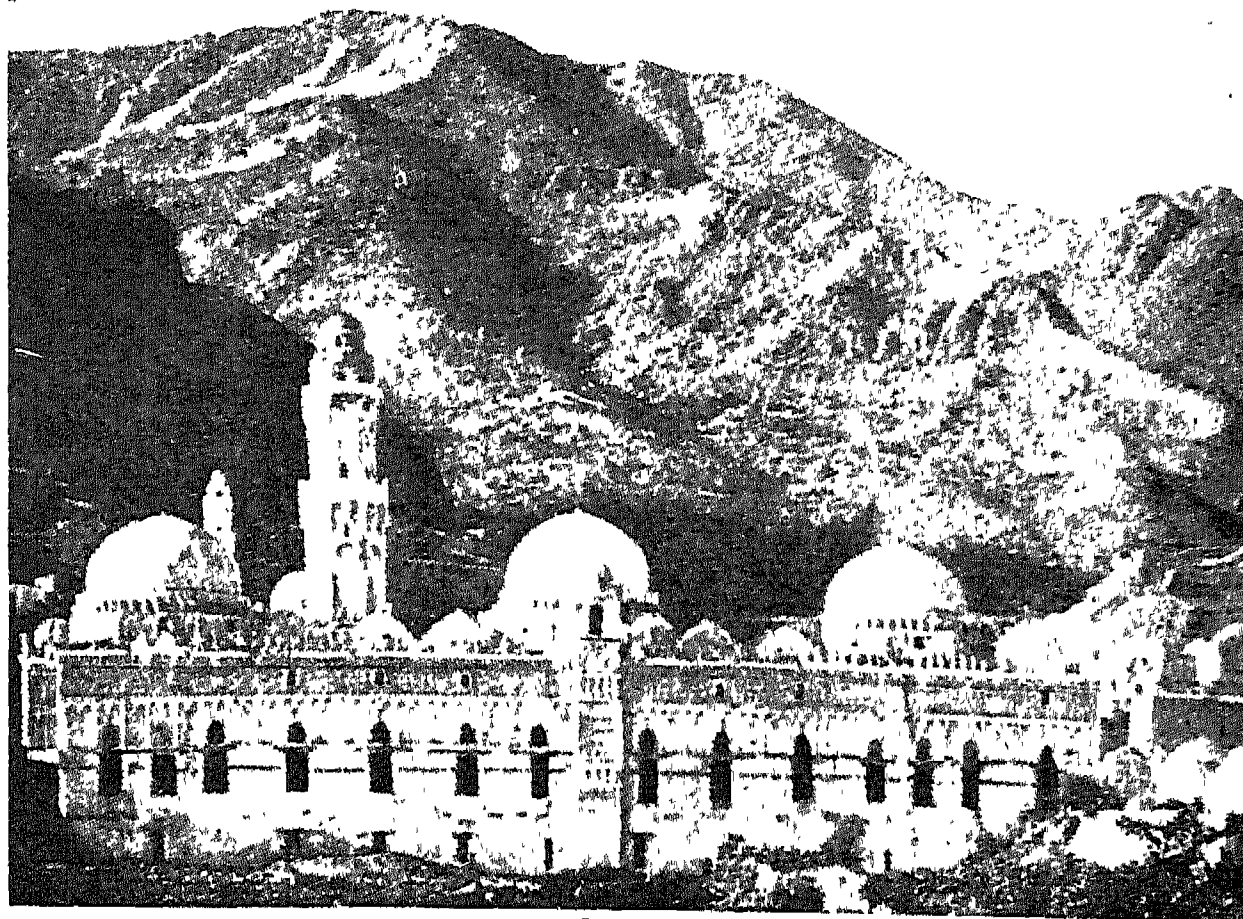
territories lying along the coasts, their hinterlands being lost in the desert plateau, which on the N. is some 2,500 ft. and on the S.W. from 7,000 ft. to 9,000 ft. above the sea. There are two strains of Arabs, one Ishmaelite in the N.,





uncultivated. South of Asir comes the Yemen; to the S. again is Aden Protectorate and the British colony of Aden. In the S.E. is the independent state of Muscat and Oman, N.W. of which, along the Persian Gulf, come in order the territories of the Trucial Sheikhs; the Sheikdom of Qatar; Hasa, part of Saudi Arabia; and Kuwait, a sultanate under British protection.

**PRODUCTS, CLIMATE, COMMUNICATIONS.** The narrow coastal plain of Hejaz and Asir, called the Tihama or low-lying country, is in places fairly thickly populated. It is a hot and humid region, whose valleys produce maize, wheat, barley, cotton, coffee, sugar, tobacco, and indigo, and abound in spice



Arabia. Two pictures from the Yemen: Menakha lying under the shelter of Jebel Shibâm and (above) the handsome mosque of Muzaffar at Taiz

and aromatic trees and plants. In Nejd, Shammar, and on the S. and E. coasts dates are the chief food. Arabia is famous for its horses and camels; the best horses come from Nejd, the best camels from Oman. After the rainy season the Arabs move their flocks and herds into those parts of the desert plateau which, suddenly green, provide good pasturage for two or three months.

The climate has extremes of heat and cold, the coastal tracts being in summer among the most torrid regions of the world. Wild beasts, which include the lion and the panther, are not numerous, nor are there many birds. Iron, copper, and lead are found, and rich petroleum deposits. The Persian Gulf coast has valuable pearl fisheries.

Arabia lacks good communications. The part within Arabia of the Hejaz rly. connecting Medina with Damascus, built 1901-08, fell into disrepair and disuse after the Second Great War; its reconstruction was being considered in 1954. A line between Riyadh and oil workings on the Persian Gulf

was completed in 1951. Metalled roads run from Jeddah to Mecca and to Medina. Ancient caravan routes cross the desert, from Mecca to Riyadh and the Persian Gulf; to Medina and Hail and on to Iraq; to Medina and Jordan; and southward into the Yemen.

Arabia has no large cities. The Hejaz contains Mecca and Medina, the holy cities of Islam, and the ports of Jeddah and Yembo; Asir has no town of importance; in the Yemen, Hodeida has to some extent supplanted Mocha, both as a port and as the centre of the coffee trade; Sana is the capital. Muscat, in Muscat and Oman, is almost the only known town of any consequence on the coast from Aden to Kuwait. In the interior are Hofuf, Riyadh, Buraida, Anaida, and Hail.

**HISTORY.** The Arabs are undoubtedly an ancient people, but until the advent of Mahomet and the development of Islam, Arabia figured hardly at all in history. For unnumbered centuries life proceeded with little or no change in primitive patriarchal com-

munities. In the S.W. there were some early attempts at organization. Such was the kingdom of the Sabaeans, traces of which go back to 700 B.C.; one of its rulers may have been the queen of Sheba who visited King Solomon (1 Kings 10). Other such shadowy kingdoms of ancient times were those of the Minaeans and the Himyarites, from whose period inscriptions survive.

On the extreme S.W., with Africa separated only by the narrow strait of Bab-el-Mandeb, there was some traffic with ancient Ethiopia, and the Abyssinians more than once crossed over and made conquests. The Romans tried, with scant success, to establish themselves in the Arabian peninsula. Christianity made no mark on Arabia, the religious centre of which was already Mecca, which held the Ka'aba, the great temple of the country, whither the tribes were wont to repair on occasion.

Early in the 7th century the Arabs became united as never before. The Koreish tribe had charge of the Ka'aba, and one of its members, Mahomet, disgusted with the idolatry of his countrymen, began about 610 to proclaim faith in the one God, which faith came later to be called Islam. This faith soon became not only a religious but a powerful aggressive political force which originated the Caliphate and conquered large areas of Asia and Africa, as well as part of Europe. Nor was the conquest merely military and religious, for with it, in its best phase, went literature, art, and science. Under the Abbaside (*q.v.*) caliphs, schools flourished as far apart as Bagdad and Córdoba, and libraries were established, notably at Alex-

andria and Cairo. Among the Arabs were also many prominent physicians, and the Arab Avicenna wrote a famous Canon of Medicine. In mathematics and astronomy (basing their work on translations from the Greek) the Arabs excelled, and all this when Europe was passing through a period of decline and darkness.

In the 14th century the Turks began to overrun the Arab conquests, and in the 16th turned their attention to Arabia itself, where they conquered the Yemen. In the 16th and 17th centuries the Portuguese took Oman and acquired a footing in the region of the Persian Gulf, which they eventually lost to the British, who captured Hormuz, on the Persian side of the Gulf, from them in 1622.

The hold of the Turks on any part of Arabia was never secure; the Yemen, for instance, was in a constant state of rebellion, and from 1891 Turkish rule was confined to a few places on the coast. Ibn Saud (*q.v.*) achieved his first conquests from the Turks in 1913. During the First Great War, the Hejaz under Hussein (*q.v.*), grand sherif of Mecca, who adopted the title king of the Hejaz, repudiated the authority of the Turks, and materially contributed to the success of the Allies in the area. Before that war ended, the Arabs on the W. had become united, and at the Paris peace conference the authority of Hussein was recognized. But his old rival, Ibn Saud, king of Nejd, made war on him, took Mecca, and forced him to abdicate 1924. Ibn Saud, who had overrun Shammar in 1921, in 1926 proclaimed himself king of the Hejaz, thus uniting Hejaz and Nejd, and in the same year brought Asir under his suzerainty. Its complete incorporation in 1933 made Ibn Saud ruler of most of the peninsula.

**Bibliography.** Arabia Deserta, C. M. Doughty, new ed., 1936; A Winter in Arabia, 1942, The Southern Gates of Arabia, 1945, Freya Stark; Arabia, 1930, Arabia of the Wahabis, 1935, A Pilgrim in Arabia, 1946, H. St. John Philby; Arabia of the Desert, H. R. P. Dickson, 1949; Arabian Journey, G. de Gaury, 1950; Saudi Arabia, K. S. Twitchell and E. J. Jurgi, 1953.

**LANGUAGE AND LITERATURE.** The Arabic language is an offshoot of the original Semitic speech, and, owing to the comparative isolation of the Arabs of the desert, is related more closely to the prehistoric language of the Semites than any other of the Semitic languages.

The earliest literary monuments of the Arabs have survived in a great number of Sabaeen or S. Arabian inscriptions, which since 1772 have been discovered, deciphered, and explained by European travellers and scholars. Many of these date from the 8th century B.C. The language is that which was spoken by the peoples of the Yemen (Sabaeans, Himyarites, Minaeans, and others), who inherited an ancient civilization. It was superseded for the most part long before Mahomet by the language of the wilder Beduins of the north.

The earliest Arabic literary productions, 5th century A.D., were verses composed by Arab poets or minstrels. They were committed to memory and handed on by "reciters," who at first were attached to individual poets.

About A.D. 700 it was felt to be important to collect and preserve the utterances of the famous pre-Islamic poets. Several

collections of their poems have been preserved. One called the Mu'allaqat is a collection of seven long odes. The Arabic name is derived from a root which has the idea of hang up. Hence the designation "suspended poems" and the legend that the poems were hung up in or on the Ka'aba at Mecca as a precious thing is hung up in a treasury or storehouse. They were also called necklaces of pearls. The authors were Amru-el-Kais, Jarafa, Zuhair, Labid, 'Amr ibn Kulthum, 'Antara, and Al-Harith ibn Hilliza. Another collection is called the "diwans of the six poets." The poets were Nabigha, 'Antara, Jarafa, Zuhair, 'Alqama, and Amru-el-Kais. Nabigha and the poet A'sha rank with the greatest poets of the period. In the collection called the Hamasa of Abu Tamman some of the poets belong to the early Islamic period. Mahomet started his preaching about the year A.D. 610. The

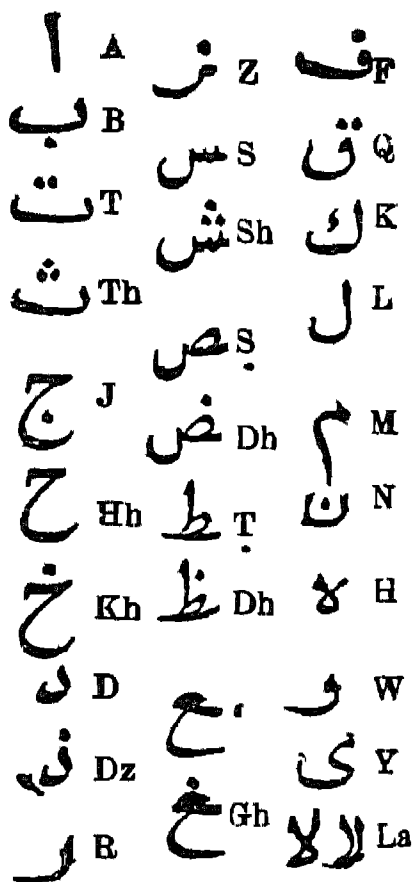
Islamic period, which is dated from the Flight (Hegira) of Mahomet from Mecca to Medina in 622, saw the rise, efflorescence, and decline, 1258, of a remarkable literary activity, to which the Koran (*q.v.*) gave the impetus. To preserve and explain the text of the sacred book bequeathed to Muslims by Mahomet, it was necessary to adopt and adapt (from Alexandrian and Indian sources) a science of grammar and lexicography, and to collect the pre-Islamic poems, the language of which provided Mahomet with his model. The language of the poets came to be regarded as classical Arabic, and it was this language that was spoken and written by cultured Muslims until the 13th century. In the 13th century it had to give place in Arabic-speaking countries (including Arabia) to a score of colloquial dialects.

The Koran was not committed to writing by Mahomet; but it was gathered up into something like the Koran of today soon after Mahomet's death. There gathered also about the prophet a mass of tradition (*hadith*), handed down at first orally and later recorded in books. One of the most ancient collections is that of Bukhari (d. 870). This kind of material was embodied also in commentaries on the Koran, the most famous of which are those of Jabari (d. 923), Zamakhshari (d. 1143), and Baydawi (d. 1286).

#### Haroun Al Rashid

The reigns of the Caliph Al Mansur (754-775), Haroun al Rashid (786-809), and Mamun (809-833) were marked by a revival of literature, art, and science; during some centuries a number of original works in all fields appeared, as well as many translations from Greek, Syriac, and Persian.

About this time famous schools of learning sprang up at Bagdad, Basra, Bokhara, and Kufah; and great libraries at Alexandria, Bagdad, and Cairo. Bagdad, where the Caliph Mamun founded a university, is said to have attracted all the chief intellects of the empire. Some of the more important writers were poets, *e.g.* Abu Nawas (d. c. 810), Abu'l-'Atahiya (738-828), Mutanabbi (915-65), and Hariri (1054-1122), whose Maqamat is considered one of the masterpieces of Arabic literature. The word *Maqama*, meaning an assembly for literary discussion, is used for a new form of literature invented by Al-Hamadhani (d. 1007). The



Arabic alphabet



Maqamat are written in rhymed prose, and are a mingling of philosophy and romance or fiction.

There were theologians, *e.g.* the mystic Ghazali, who was surnamed "the proof of Islam," and Shahrastani (d. 1153), author of a book of religions and sects; men of letters, *e.g.* Ibn Qutayba (d. 889), author of a book of general knowledge, and Abulfaraj-al-Isfahani, compiler of a great book of songs; historians, *e.g.* Ibn Ishaq (d. 768), who compiled the first biography of Mahomet, Mas'udi, who has been called the Herodotus of the Arabs, Abulfaraj (d. 1286) the author of an epitome of dynasties, Abulfeda (d. 1331), who wrote an epitome of universal history, Suyuti (1445-1505), who, among 561 works, wrote a history of the caliphs, and Ibn Iyas (d. c. 1524), who wrote a history of Egypt.

#### Encyclopedists of Arabia

There were encyclopedists and dictionary-makers, *e.g.* Al-Qazwini, who in 1135 wrote a popular encyclopedia of a religious, moral, geographical, and historical character, and Ibn Khallikan (1211-82), author of a great dictionary of biography; geographers, *e.g.* Al-Idrisi (d. 1099) and the famous Yaqut (1179-1229), who compiled a great geographical dictionary; philosophers, *e.g.* Al-Kindi, who flourished at the beginning of the 9th century, Avicenna, and Averroës; scientists, *e.g.* Al-Farghani (Alfraganus), Abu Mas'har (Albumasar, d. 885), and Al Battani (Albategnius, d. 929). The words alchemy and algebra are of Arabic origin—an indication of the great part played by the Arabs in the spread of scientific investigation.

The book well known to English speakers as *The Arabian Nights* (Arabic *Alf Layla wa-Layla*, thousand and one nights) seems to have been based upon an old Persian book, *Hazar Afsana* (thousand tales). Another famous work containing fables, the book of *Kalila and Dimna*, was translated from Persian into Arabic by the Persian *Ibnul Muqaffa'* (d. c. 760). A third work, the romance of *'Antar*, is probably not later than the Crusades.

A revival of Arabic literature during the 19th century followed traditional lines, but with strong westernising influences, fostered by such leaders as Mohammed Ali and Ismail Pasha, and throughout the Arab-speaking world an Arabic press sprang into being. Literary journals gave scope for short



Arabia. A camel driver of the Beduin, the wilder desert people of north Arabia who are, according to Arab tradition, of Ishmaelite descent

stories and essays. Novels were written. In poetry there was a wide range of style, from the traditional to the ultra-modern, of which Shawki Bey and the Iraqi poet el-Zahawi are examples. A literary drama exists, in both poetry and prose, owing its origins to French symbolism. Consult *Literary History of the Arabs*, R. A. Nicholson, 1930.

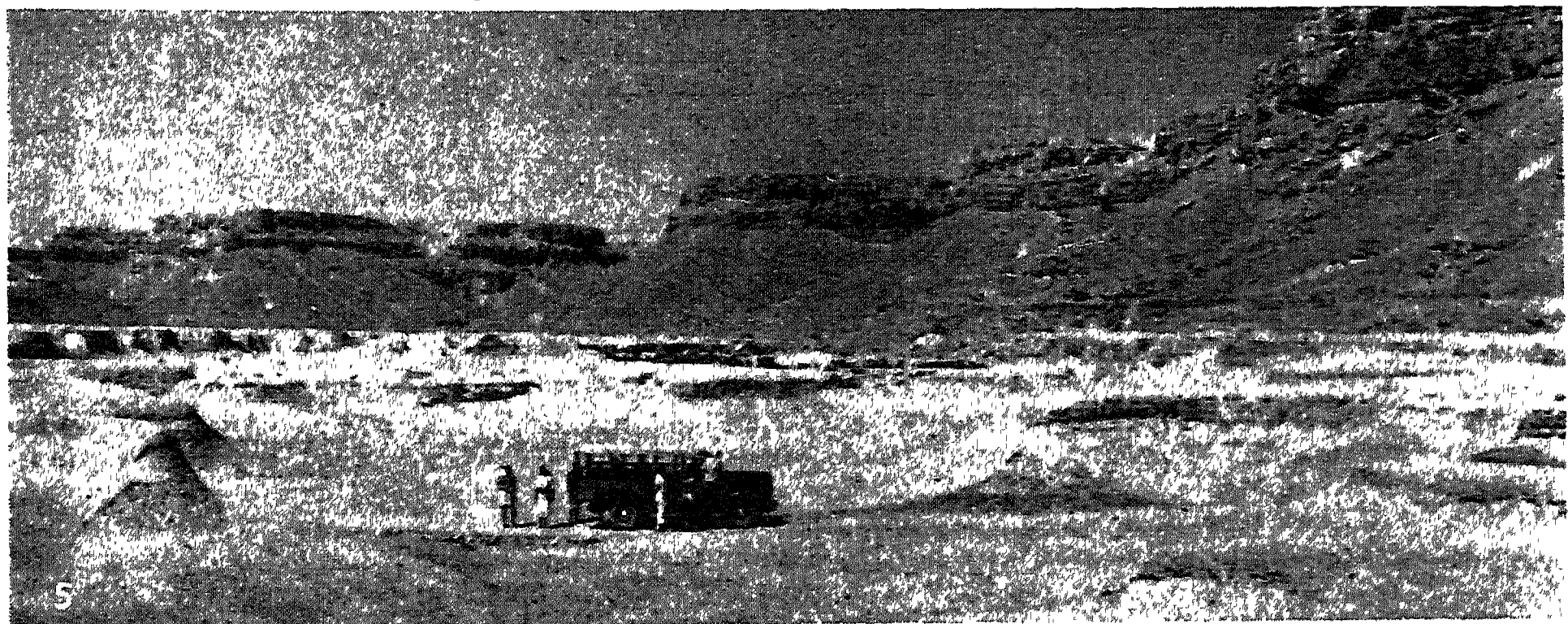
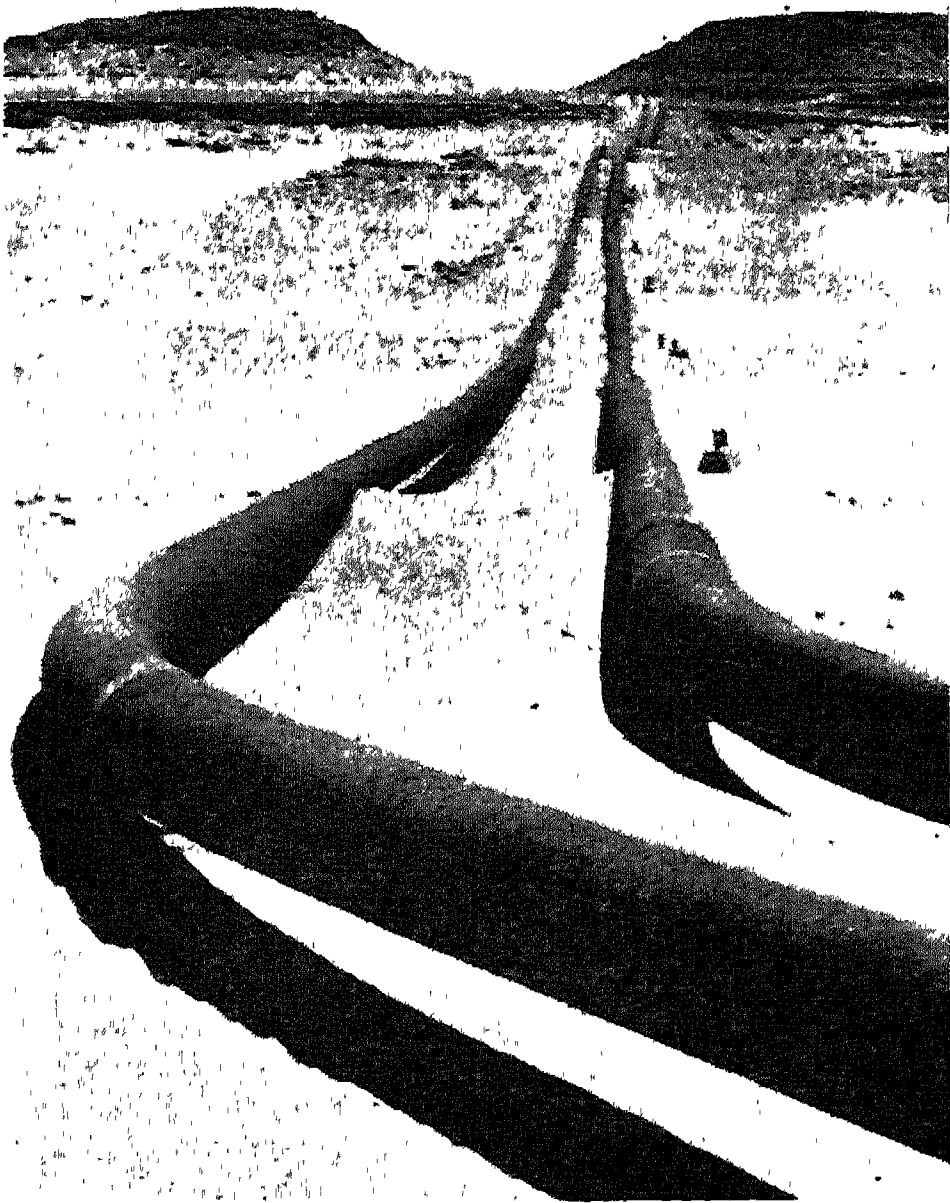
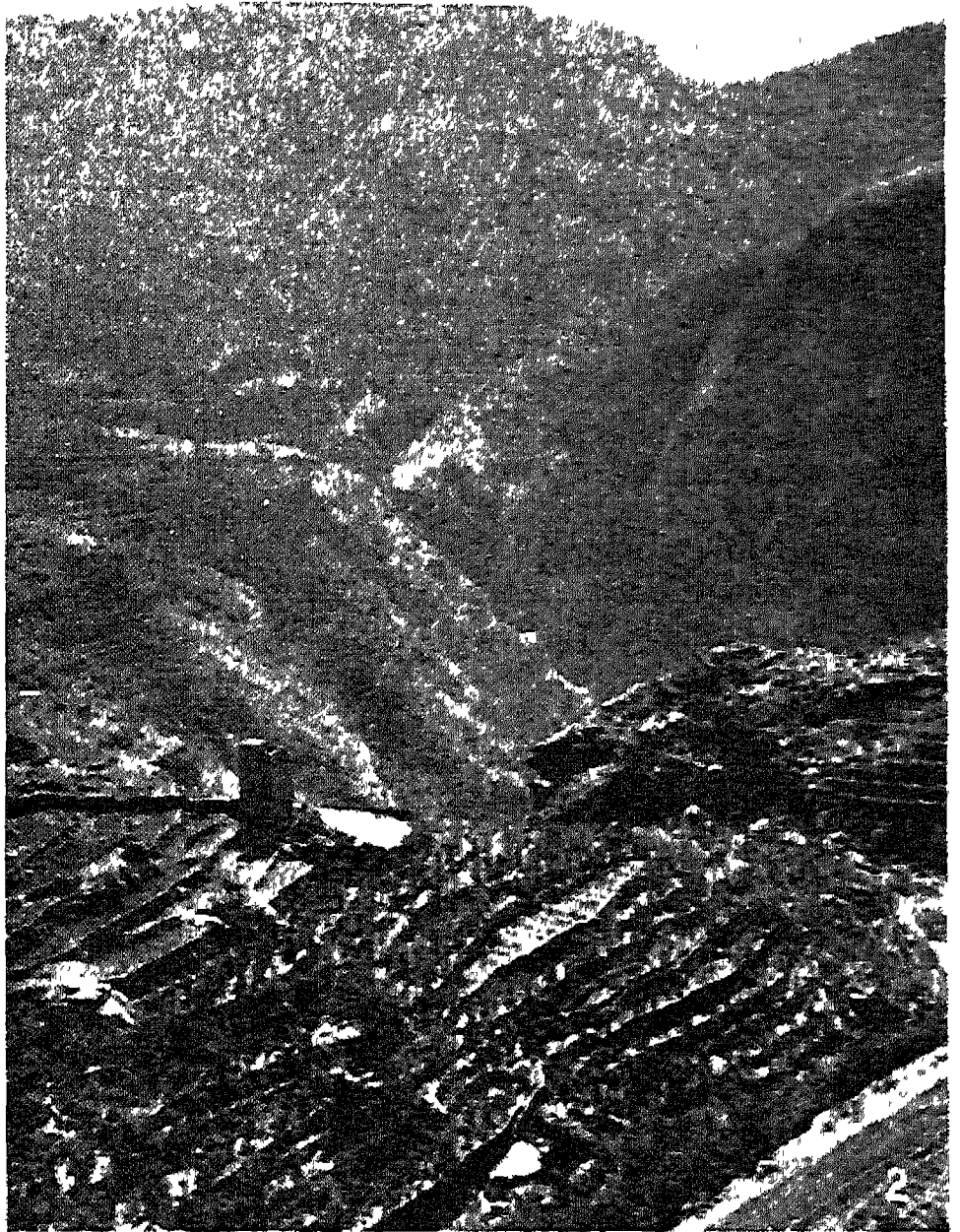
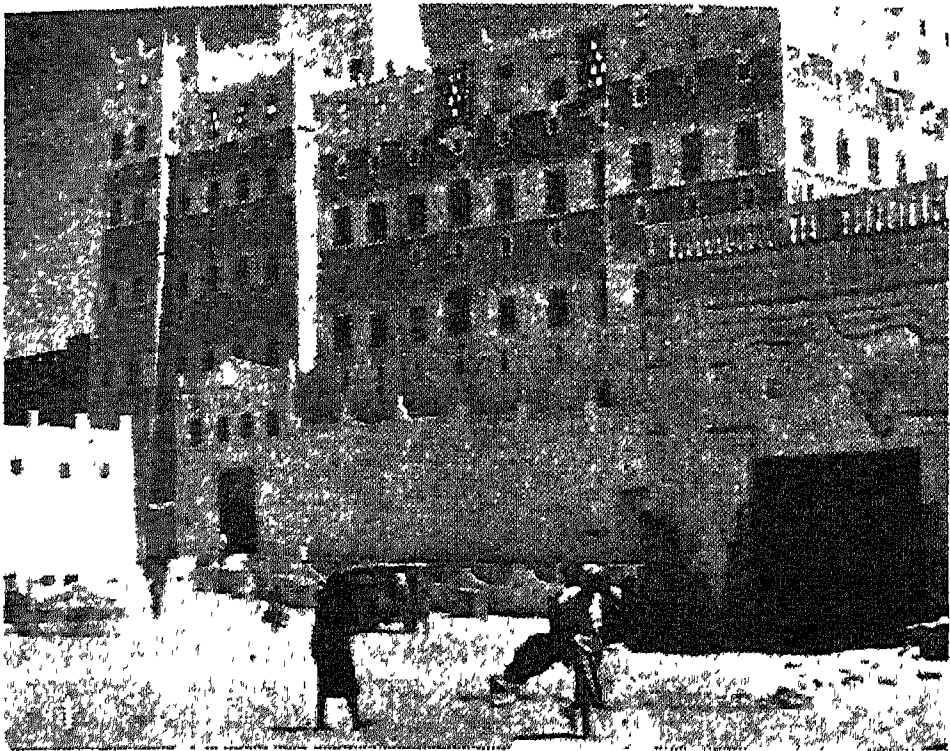
**Arabian Nights' Entertainments, THE.** Popular title of a collection of Oriental stories of undefined antiquity. The Arabic name, *Alf Layla wa-Layla*, is more literally rendered in the alternative titles, *A Thousand Nights and a Night*, or *The Thousand and One Nights*. Arabic writers of the 10th century refer to the work as a Persian one, but the name given to the first rendering of it into western languages has permanently associated it with the Arabs. The scheme of the work by which the various stories are linked may be summarised thus: The Sultan Schahriar, convinced that all women are faithless, has sworn to take a new wife every night and to have her slain the following morning. Scheherazade voluntarily becomes his wife, and by the telling of the tales with a continuing thread at the end of each story, wins respite from day

to day, until after a thousand and one nights she wins her own security and changes Schahriar's views.

In the form handed down, the stories are variously said to have been compiled for the daughter of the Biblical Esther, to have been borrowed by the Arabs from Persian or Egyptian sources, and to have been a series of tales added to from century to century. Some of the stories have been traced to ancient Egyptian and Persian originals; few seem to be of purely Arab origin.

The work first became known in Europe when French translations of portions of it by Antoine Galland were published, 1704-17. Numerous English translations followed, but in 1841 E. W. Lane's translation, directly from the Arabic, was published and became the standard edition for most readers. Then in 1885-88 was published Sir Richard Burton's very full version, of which a popular edition, prepared by Lady Burton and Justin M'Carthy, was issued later and re-issued a number of times. Many of the tales, *e.g.* that of Ali Baba and the Forty Thieves, have become as familiar to the western peoples as their own folk-tales; in England some have served as a basis for Christmas pantomimes. See also *Aladdin*.





1. Sultan's palace in Shibam, a town of the Hadhramaut region of the Eastern Aden Protectorate first visited by a European in 1931. 2. Coffee growing on a terraced mountainside in Yemen. 3. Oil pipe-lines traversing

the Saudi Arabian desert to Dhahran, on the Persian Gulf. 4. Reda, Yemen, with the citadel in the background. The buildings are of mud bricks. 5. Bus in the dried-up bed of a watercourse in the Hadhramaut

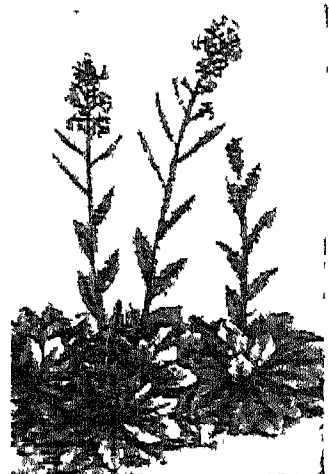
# **ARABIA: TOWNS, MOUNTAINS, AND DESERTS OF THE PENINSULA**



**Arabian Sea** (anc. Mare Erythraeum). That part of the Indian Ocean lying between Arabia and India. Its N.W. extension is the Persian Gulf through the Gulf of Oman, and its S.W. arm is the Gulf of Aden, connected with the Red Sea by the strait of Bab-el-Mandeb. It contains the Laccadives, the Kuria Muria Islands, and Sokotra, and receives the river Indus.

**Arabin** OR ARABIC ACID. Chief constituent of gum arabic. It occurs combined with calcium, magnesium, and potassium. It is prepared by adding hydrochloric acid to a mucilage of gum arabic and alcohol afterwards, when the arabin is precipitated. Allied substances are cerasin or metarabic acid, prepared from cherry tree gum, and parabin, obtained from beetroot and agar-agar. Arabinose ( $C_5H_{10}O_5$ ) is a sugar obtained by the action of sulphuric acid on gum arabic or sugar-beet pulp. It is a sweet-tasting substance used as a bacteriological medium.

**Arabis** OR ROCK-CRESS. Genus of annual and perennial herbs of the large family Cruciferae. They are natives of the N. temperate zone.



Arabis. The Alpine rock-cress

The hairy basal leaves are spoon-shaped, and the four petals of the flower usually white or purplish. The Alpine rock-cress (*A. alpina*) of Europe is a popular garden plant.

**Arabistan.** District of Persia. Known also as Khuzistan, and in ancient times as Susiana, it lies between Luristan on the N. and Farsistan and the Persian Gulf on the S., and has a frontier with Iraq, on the W. It is watered by the Karun, and Dizful is its chief town. It contains extensive deposits of oil. The N. part of the prov. is hilly, the S. fairly level. The pop. is nomadic.

**Arabkir** OR ARAPKIR. Town of Turkish Armenia, in the vilayet of Malatya. It is 100 m. N.W. of Diarbekir, and was the scene of a massacre of the Armenians by the Turks in 1895. At that time its pop. was 30,000. It trades in cotton goods, and is noted for fruit.

**Arab League.** International body for promoting unity among the Arab states of the Near East. The formation of the league was decided on at a conference held in Alexandria Sept. 25–Oct. 7, 1944,

between Egypt, Iraq, Syria, Lebanon, and Transjordan. Saudi Arabia and the Yemen accepted the protocol there drawn up, and on March 22, 1945, a "pact of union of the Arab states" was signed in Cairo.

The organization began to make itself felt as a political power in 1946–47 when it supported Egypt's claims to the Sudan against Gt. Britain. Then, in Sept., 1947, it declared it would fight for Palestine, in support of the Palestinian Arabs, and, after the U.N. had accepted the partition plan for that country in Nov., it began military operations. At first successful, these took late in 1948 an unfavourable turn, and the league lost its cohesion when its member countries discussed and signed separate armistices with Israel: Egypt on Feb. 24, 1949, Lebanon on March 23, Transjordan (Jordan from June 2) on April 3, Syria on July 20.

An Arab "government" claiming sovereignty over the whole of Palestine was formed at Gaza, Sept. 22, 1948, by Haj Emin el Husseini, the ex-mufti of Jerusalem, and recognized by all members of the league except Transjordan, whose ruler Abdullah on Dec. 20 approved a proposal for the union of Transjordan and Palestine made by a congress of Palestine Arabs held at Jericho. (On the same day he nominated a new mufti of Jerusalem). The union of Jordan and the part of Palestine under Jordanian control came into effect on April 24, 1950, and after that the league lost its effectiveness. Libya was admitted in 1953, Sudan in 1956, in which year, led by Egypt, it began to recover its strength.

**Arab Legion.** Armed formation of Transjordan (later Jordan), supported by a British subsidy. Raised in 1926 as a police force, under F. G. Peake, it dealt with tribal raiding. It had two sections—one for duties in settled areas, the other, under J. B. Glubb (*q.v.*), a desert patrol. In 1939 Peake Pasha retired, and Glubb commanded the whole legion until dismissed by King Hussein in 1956. During the Palestine troubles of 1936–38 the desert patrol protected Transjordan from rebel activities.

When the Second Great War started a mechanised regiment was formed from the patrol and placed by the ameer at the disposal of the U.K. It carried out reconnaissance and protected lines of communication. In 1941 it helped to rally Iraqis hostile to

Rashid Ali, and guided the flying column that crossed the desert from the Mediterranean to relieve the R.A.F. force encircled at Habbaniyah aerodrome. Later the regiment served against Vichy French forces in Syria. In the early part of 1948, the Arab legion carried out police duties in the Arab areas of Palestine during the disturbances that preceded the ending of the British mandate; and when hostilities broke out with the new state of Israel on the night of May 14–15 it bore the brunt of the fighting for the Arab cause, British officers being withdrawn from front-line units. *Consult* The Story of the Arab Legion, J. B. Glubb, 1948.

**Arabs.** Southern stock of the Semitic peoples. It includes strictly the nomad N. Arabian or Beduin tribes and the tribes which have settled in the S. of Arabia, especially the Yemen. The term is used in Egypt and elsewhere in N. Africa for any people professing Islam; and by extension has become a general designation for most living Semites who are not Jews. In remote times Arabs crossed to Abyssinia. The introduction of Islam, A.D. 622, led to new migrations which within a century had flowed over N. Africa into Spain and France, while others founded an empire in India, and voyaged to the Malay and African coasts. Similarly the nomad Beduin spread over what is now Iraq. Such a history has resulted in marked variations in the physical characteristics of the Arabs, especially in Africa where they have intermarried freely alike with Hamitic (Berber) and with negro stock. Only in Arabia itself, where they may number 10,000,000, have they bred more or less to uniform type.

They are dolichocephalic (long-headed), black haired, scantily bearded, lithe, muscular, fine featured, averaging 5 ft. 4½ ins.; whereas the S. Arabian is usually straight-nosed, the Beduin tends to the aquiline. They are courageous, temperate, imaginative, and passionately fond of poetry. Hospitable to guests (anyone who has eaten a tribesman's salt is safe for four days after leaving his tent), in business they are parsimonious, and will cheat for pleasure. Normally chivalrous, they can also be savagely vengeful. They are adventurous seafarers.

The social organization has preserved its rigid patriarchal form throughout; hence their brief empires invariably yielded to those



1. Beduin woman. 2. Water-seller at Soheiya, coastal town of the kingdom of Yemen. 3. Beduin of the desert. 4. Bagdad potter applying the glazing mixture to a bowl. 5. Young pupils of a desert school, each with his

copy of the Koran. 6. Dignity and grace distinguish these Arabs of a higher social class in Amara. 7. Three natives of Bethlehem. 8. Cobbler of Bagdad. 9. An Arab chief dispenses hospitality in his tent

# **ARABS : REPRESENTATIVE TYPES FROM THE NEAR AND MIDDLE EAST**



of more versatile character. Under monotheism they have given the world an intense poetry and a profound religious philosophy. Except for mathematics, the scientific concerns of the western world have drawn little response from them. Their medicine and surgery are barbaric and tolerable only among people of stoical endurance. Mechanics and classified experiment are outside their purview. Women are regarded as natural inferiors to men, perform all the work, and are usually married in adolescence. Arabs live mainly on dates, other fruit as obtainable, milk, butter, bread, and mutton, and drink coffee. The Beduin economy is based upon the camel.

**Aracajú.** City of Brazil. The capital of Sergipe state, it stands on the Cotinguiba, 7 m. from the Atlantic, and is connected by rly. with the interior. It has iron foundries, manufactures soap and cloth, and exports sugar, brandy, cocoa, coffee, cotton, salt, and hides. Pop. (1950) 68,686.

**Aracaty.** City and port of Brazil. In Ceará state, it stands on the Jaguaribe, 8 m. from the Atlantic and 75 m. S.E. of Fortaleza. It exports cotton, hides, and palm wax, and has a seaplane base. Pop. (est.) 6,500.

**Araceae** (Latin *arum*, wake-robin). Family of herbs and climbing shrubs possessing poisonous properties. Most of them are natives of tropical countries, but a few occur in temperate and even cold climates. The rootstocks are tuberous and contain starch. The small simple flowers are clustered around a common support called a spadix, and protected by a cowl-like envelope called the spathe. There are about 100 genera and about 1,900 species.

**Arachnida** OR ARACHNOIDEA (Gr. *arachnē*, spider; *eidos*, form). A class of the zoological phylum Arthropoda, to which the crustaceans and insects also belong. It includes spiders, scorpions, harvesters, mites, and certain other animals. They have usually six pairs of limbs, of which four pairs are walking legs, the others being used for seizing food and conveying it to the mouth. The head and thorax are fused together, not separate as in insects, and the eyes, unlike those of insects, are generally simple. The abdomen is in some genera segmented, and may or may not bear appendages. In the scorpion its extremity is developed into a sting connected with a poison bag. The sexes are always separate, and

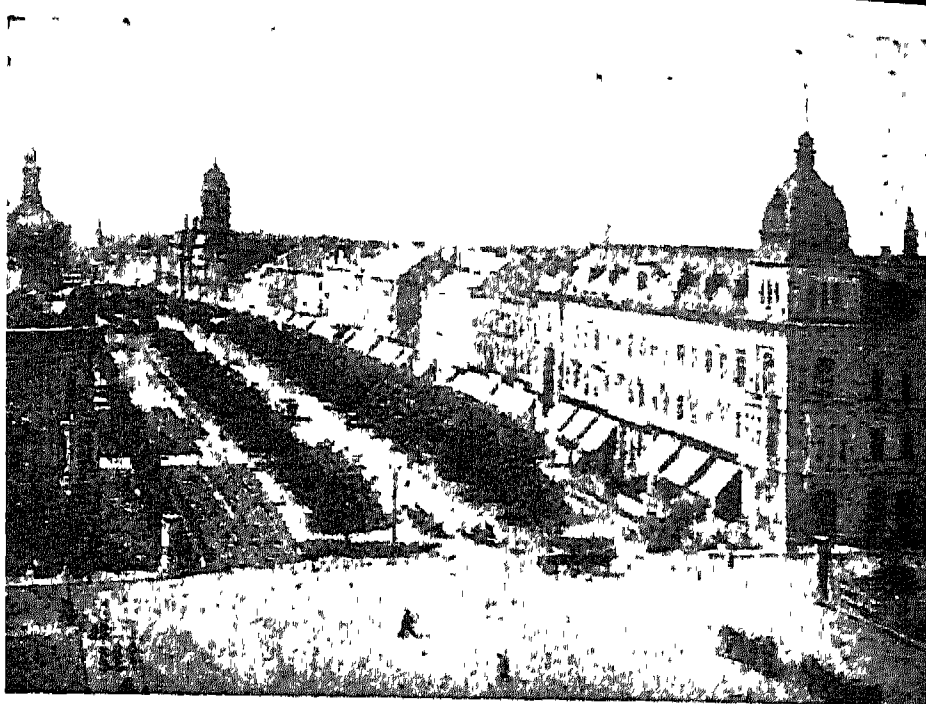
nearly all the arachnids are carnivorous, though there are many mites which feed on crops and stored products. Silk is produced by all spiders and some mites. As a class the arachnids, with the exception of the mites, are not of very considerable economic importance, though the work of spiders in keeping down insects is often underestimated. Most of the fossil arachnids belong to the marine orders Xiphosura, of which the king crab, *Limulus*,

being found only in the Palaeozoic rocks. They lived mainly in Silurian and Old Red Sandstone times; some attained great size.

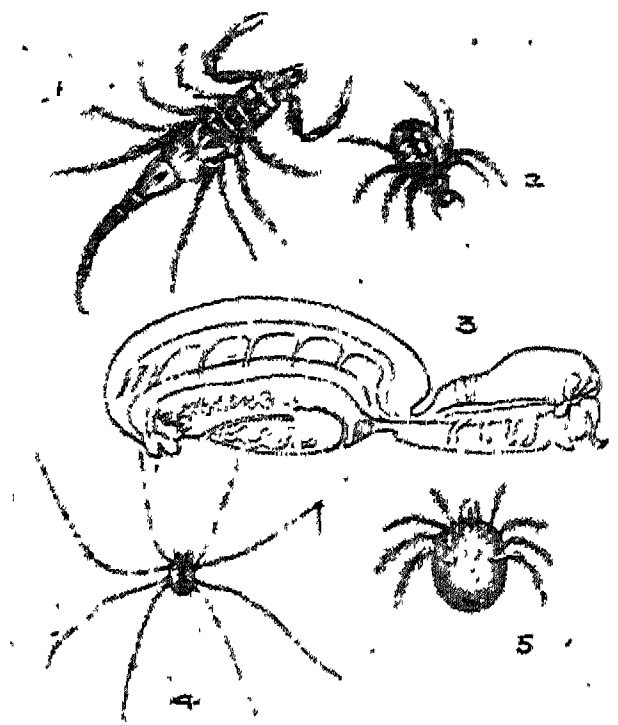
**Aracituba.** City of Brazil N.W. of São Paulo to which it is connected by rly. A trading centre for an agricultural settlement composed chiefly of Japanese and producing cotton, coffee, and cattle, it has cotton ginning, meat-packing, diaring, saw-milling, and distilling industries. Pop. (1950) 27,692.

**Aracuai.** Town of Brazil on the Aracuai river in N.W. Minas Gerais where there are desposits of graphite. It is a centre for diamond washing and for semi-precious stones. Pop. (est.) 4,100.

**Arad.** Town of Rumania, capital of a region of the same name. It is on the right bank of the Mures (Maros), near the Hungarian border, 30 m. N. of Timisoara. It has an airport and is an important rly. centre making rolling stock, textiles, especially silk, electrical products, etc.; there is trade in grain, cattle, and wine. The town dates from the



Arad. General view of one of the chief thoroughfares of the capital of Arad county in the Hungarian plain

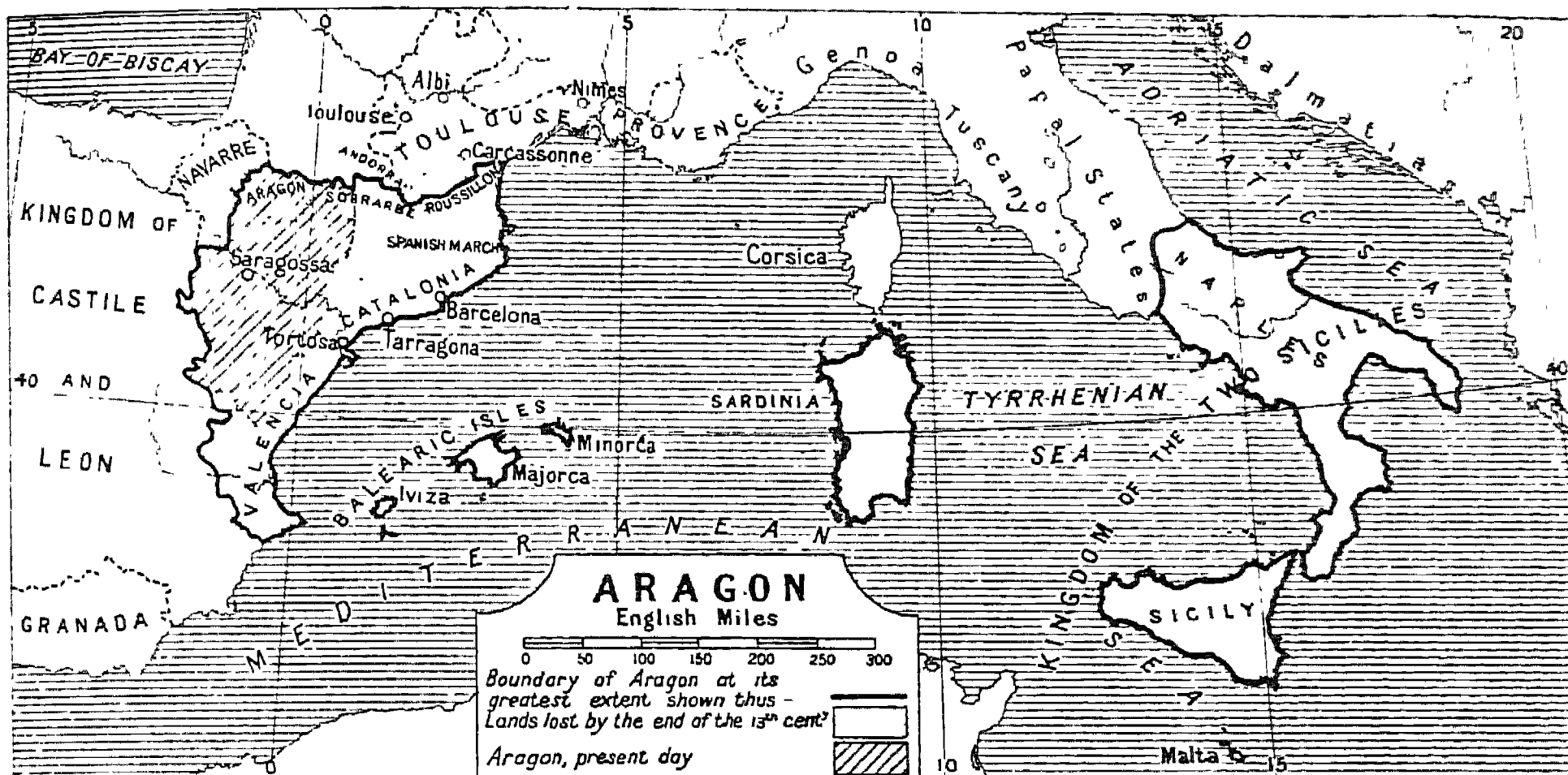


Arachnida. 1. Scorpion. 2 and 3. Common garden spider, and enlarged section of same. 4. Harvester. 5. Water-mite. 4 and 5 greatly enlarged

is the only living representative: it made its first appearance in the Triassic rocks; and the Euryp-terids, all extinct, their remains



Arafat. View of the Arabian granite hill called Mount Arafat, and the Mountain of Mercy, which stands about 15 m. S.E. of Mecca



Aragon. Map of the ancient kingdom which was later incorporated in the kingdom of Spain

11th century, and was a Turkish fortress during 1542-1699. Modern buildings include a theological seminary and teachers' colleges. Before its transfer to Rumania under the treaty of Trianon, 1920, Arad was Hungarian and played an important part in the Hungarian struggle for freedom, 1848-49. Here the Hungarian patriot Kosuth abdicated his command in favour of the military leader Görgei before the surrender to Austria, and a monument commemorates the shooting of 13 Hungarian generals by the Austrians. Pop. (1948) 87,291.

Aradul-Nou (Hung. Ujarad, new Arad), on the opposite bank of the Mures, is a small town with a motor car factory. It was founded during the Turkish wars of the 17th century, most of its first inhabitants being German colonists. Pop. (est.) 6,000.

**Aradus.** See Arvad.

**Araf** OR AL ARAF. Islamic purgatory. It is described in the seventh chapter of the Koran as a partition separating Paradise from Hell, into both of which those placed thereon can lock.

**Arafat** OR JEBEL-ER-RAHMA. Hill of Arabia lying 15 m. S.E. of Mecca. Called the mountain of mercy, it is a place of pilgrimage to Muslims. It is about 200 ft. high (illus. in p. 522).

**Arafura Sea.** Shallow sea between the Northern Territory of Australia and the W. of New Guinea, containing some of the easternmost islands of Indonesia.

**Aragats.** Mt. of Armenia S.S.R., lying about 15 m. S.E. of Leninakan. Of volcanic formation, it has an alt. of 13,450 ft.

**Arago, DOMINIQUE FRANÇOIS** (1786-1853). French scientist, whose achievements included the discovery of rotatory magnetism; the proof of a connexion between fluctuations in the earth's magnetic field and the aurora borealis; and the first suggestion that the sun is wholly gaseous. He gave valuable support to Fresnel in developing the undulatory theory of light and devised the crucial experiment for its proof by comparing the speed of light passing through air, water, and glass.



D. F. Arago, French astronomer

Born at Estagel, near Perpignan, Feb. 26, 1786, Arago entered the École Polytechnique in 1804, and was made secretary of the Bureaux des Longitudes in 1805. He was engaged in measuring the arc of the meridian from Barcelona to Formentera in the Balearic Islands when he was caught in the Spanish rising of 1808, and held for three months in Spanish prisons. On his return to Paris, he became professor of analytic geometry at the École Polytechnique, 1809, director of the observatory and perpetual secretary of the Académie des Sciences, 1830. After the revolution of 1830, Arago entered the chamber of deputies as an extreme republican. In 1848 he became minister of war and marine in the provisional government, and was instrumental in the abolition of flogging in the navy and of negro slavery in the colon-

ies. In 1852 he declined to take the oath of allegiance to Napoleon III, but was excused. He died in Paris on Oct. 2, 1853.

**Aragon.** Name of one of the kingdoms into which Spain was formerly divided. It was bounded N. by the Pyrenees, E. by Catalonia and Valencia, S. by Valencia, and W. by Castile and Navarre. It is covered by the modern provinces of Huesca, Saragossa (Zaragoza), and Teruel. The Ebro flows through it and in it are the highest summits of the Pyrenees. Its capital was Saragossa (Zaragoza).

Aragon (a Roman province until taken by the Visigoths in 420, who lost it to the Moors in 711) was one of the states that arose with the conquest of northern Spain from the Moors. It seems certain that in the 11th century a small part of it, the northern, was ruled by Sancho the Great of Navarre, while the remainder was in the Moorish kingdom of Saragossa. When Sancho died in 1035 his realm was divided among his sons, of whom Ramiro fought against the Moors and Castilians, by whom he was slain in battle. His son and successor, Sancho Ramirez, maintained the war, annexing Navarre to Aragon in 1076. The victory of the next king, Pedro, over Moors and Castilians in 1096, legend says, was mainly due to the intervention of S. George, and from then on the kings of Aragon had as their device S. George's cross upon a silver shield.

Alphonso the Warrior, who began to reign in 1104, married a daughter of the king of Castile



and Leon and held those kingdoms until they quarrelled and the marriage was annulled. For many years he fought against the Moors. In 1118 he took Saragossa after a long siege, and in 1134 was killed in battle, Navarre being then lost.

Alphonso left no sons, and bequeathed his dominions to the Templars, the Hospitallers, and the Knights of the Holy Sepulchre; but the Aragonese nobles objected, and chose his brother Ramiro as king. Another period of conquest then began. The Moors were driven from Catalonia, and the boundaries of Aragon extended to the coast, taking in Barcelona. James I the Conqueror took the Balearic Islands from the Moors and in 1238 reduced Valencia. With the accession of his son Pedro IV in 1276, Aragon began to take part in the affairs of Italy. Pedro's wife was heiress to Sicily, and the people of that island implored his aid against the French. In 1282 he sailed from Barcelona, was proclaimed king, and defeated the French by sea and land. After a brief separation Aragon and Sicily were again united under James II in 1291, but almost at once the island was given to his brother Frederick.

James I had ruled the Balearic Islands and Sardinia, and Roussillon. Roussillon and the islands did not pass to his son Pedro III, but under Pedro IV (d. 1387) they were again ruled by a king of Aragon. Pedro IV passed his reign of 50 years in struggles with his nobles and in warfare with Genoa for the possession of Sardinia. His younger son Martin (reigned 1395-1410) spent time and money in attempts to secure Sicily and Sardinia, and on his death without sons civil war broke out in Aragon. In 1412 Aragon, Catalonia, and Valencia each sent three deputies to Caspe to vote on the monarchy. Fernando, grandson of Pedro IV and also a prince of Castile, secured a majority, captured his rival, and, ascending the throne, prepared the way for the union of Castile and Aragon.

His brother Alphonso was chosen by Joanna, queen of Naples, as her heir. On his first expedition he drove the French from the city, but on the second his fleet was destroyed and he himself taken. Released, Alphonso defeated the French and Genoese, afterwards persuading the pope to recognize him as king of the Two Sicilies, *i.e.* Naples and Sicily. On his death in 1458 Naples passed to his son Ferrante, and

Aragon to his brother John, whose Catalan subjects rebelled against him. But the great event of the reign, which ended in 1479, was the marriage of his son Ferdinand (*q.v.*) to Isabella of Castile in 1469.

The constitutional history of Aragon anticipates that of England. In the 12th century or earlier it had its cortes, in which the communes were represented, and its justiza was an official whose powers included the right to review the king's actions. Powerful nobles claimed that their privileges were independent of the king's grant or favour; and the people as a whole appealed, often with success, to ancient customs.

**Aragon, Louis** (b. 1897). French writer. Born in Paris, Oct. 3, 1897, he studied medicine before taking up literature. A follower of dadaism (*q.v.*), he moved on to surrealism, under the influence of which he wrote the poems *Feu de joie*, 1920, and *Le*



Louis Aragon,  
French writer

*mouvement perpétuel*, 1924. His first novel, *Anicet*, appeared in 1921. After a visit to Russia in 1930, he joined the Communist party. In *Les cloches de Bâle*, 1934, *Les beaux quartiers*, 1936, and *Les voyageurs de l'impériale*, 1943, he castigated the propertied classes. *Aurélien*, in the same vein, is his most powerful book. Aragon served in both Great Wars. His most famous poems, written 1939-40, appeared in *Le Crève-Coeur* and *Les Yeux d'Elsa*; they include patriotic poems on the defeat of France and verses to his wife, the writer Elsa Triolet.

**Aragona.** Town of Sicily, in Agrigento province. It is 7 m. by rly. N.N.E. of Agrigento, and has an old castle containing some fine paintings. Near by are sulphur mines and the small mud volcano, Maccaluba, 138 ft. Pop. (1951) 17,089.

**Aragonite.** Mineral form of calcium carbonate differing from calcite in its crystalline form, which is orthorhombic, and in being less stable, heat or pressure converting it into calcite. It occurs as crystals or in stalactitic form, often associated with beds of gypsum or iron ore. Many organisms secrete shells or skele-

tons of aragonite, *e.g.* molluscs, corals, algae.

**Aragua.** State of Venezuela. It lies between Miranda and Carabobo states, and is bounded on the N. by the Caribbean Sea. It produces cattle, coffee, sugar, tobacco, cocoa, and cotton. The capital is Maracay. Area 2,160 sq. m. Pop. (1950) 189,891.

**Araguaia.** River of Brazil. Rising in the Serra do Cayap, it flows N.N.E. for 1,100 m. to São João on the Tocantins, whose chief tributary it is. Called in its upper reaches the Rio Grande, it divides about the middle of its course to enclose the island of Bananal, area 8,000 sq. m., uniting again about 100 m. lower down.

**Arakan.** Division of Burma, on the Bay of Bengal. It covers nearly all the W. seaboard of the country, from the Naaf estuary bordering Chittagong (Pakistan) to a point S. of Gwa. About 350 m. from N. to S., it varies in breadth from 90 to 15 m. Monsoon rainfall exceeds 200 ins. annually. The Kaladan, also called the Arakan, is the principal river. Akyab is the capital, a port 50 m. S.S.W. of Myohaung, anciently called Arakan. The people are Buddhists. The country, once independent, was seized by Aurungzebe; settled by the Portuguese; conquered by the Burmese, 1782; ceded to Great Britain by the treaty of Yandaboo, 1826. The Arakan Hill Tracts are on the India-Pakistan border. Eighty p.c. of the people are Chins. Pop. (1941) 1,152,733.

The Arakan Mts. run from the S. border of the division down the coast to the Bassein river. The Arakan Yoma is a central range running N. and S. which in places forms the boundary with Magwe separating Burma from E. Pakistan and Assam, India. The range rises in places to over 6,000 ft., and forms an effective barrier for central Burma against the S.W. monsoon.

During the Second Great War, Arakan was overrun by the Japanese in May, 1942. In Dec. of the same year the British recovered part of the territory (*see* Buthidaung), but were compelled to withdraw in May, 1943. Arakan was not reconquered until April, 1945. *See* Burma Campaign.

**Araks.** Russian name of the W. Asian river described under its Turkish name of Aras.

**Aral, SEA OF** (Kirghiz Aral Denghiz, island sea). Large inland sea or lake of Soviet Central Asia. Lying in the Aral Caspian

lowlands, it is separated from the Caspian Sea by the Ust-Urt plateau. It has a greatest length of 235 m., extreme breadth of 180 m., depth varying from 30 ft. to 220 ft.; area 24,500 sq. m., continually decreasing by evaporation. Slightly saline, it contains a variety of fish, especially sturgeon, carp, and barbel. It is fed by the Amu-Daria and Syr-Daria, but has no outlet.

**Araliaceae.** Family of dicotyledons, mainly climbers, shrubs, and trees. They have alternate leaves and regular flowers clustered in umbels or heads, and succeeded by berry-like fruits containing one or more seeds. There are 55 genera, including about 700 species. The family gets its name from the rice-paper plant (*Aralia papyrifera*), but a better known example is ivy (*Hedera helix*).

**Aram.** Biblical word applied to an ethnical group speaking a Semitic tongue (see Aramaic), and also to the territory occupied by this group. In the Table of the Nations (Gen. 10) Aram, the "ancestor" of the Aramaeans, is described as a son of Shem, while Gen. 23, v. 21 makes him a grandson of Nahor, Abraham's brother. Jacob is termed a wandering Aramaean; his mother and his wives are also stated to be Aramaeans. Syria and Syrians were the Greek terms for Aram and Aramaeans.

The original home of the Aramaeans is unknown, but it is generally held that they moved from north-eastern Arabia into Syria on one side, and into Mesopotamia on the other. Aramaean tribes reached the Upper Euphrates before 1800 B.C.; the Sutu and Akhlamu tribes were thereafter formidable enemies of the settled populations of Syria and Mesopotamia. Towards the close of the 13th century B.C., a few minor Aramaean states made their appearance in north-western and south-western Mesopotamia. The 12th and 11th centuries B.C. were the period of the ultimate settlement of the great Aramaean wave of migration which flowed into northern Syria. The Aramaean tribes took the maximum advantage of the political and social disintegration of the region, and—by force of arms and numbers—established a chain of petty kingdoms in the most favourable lands of northern and southern Mesopotamia and in western Syria.

By far the most important of these states was Damascus (the Biblical Aram Dammesheq or—simply—Aram). Aram Naharaim

(Aram of the Two Rivers) was the region of Upper Mesopotamia, the ancient Naharin (Mitanni, *q.v.*); other rich and powerful states were Hamath, Zobah, Arpad, and Sam'al (Zinjirli, in northern Syria). Another branch, moving S.E. into Lower Mesopotamia, retained their tribal organization. For two or three centuries the Aramaean city states of the west controlled the main trade routes of W. Asia. The end of the 11th century B.C. and the first half of the 10th century mark the climax of Aramaean political power. In the course of the 9th and 8th centuries the Aramaean states, one after the other, succumbed to Assyrian power. Damascus stood out longer than all the rest; it fell in 732 B.C. See also Aramaic Language. Consult Aram and Israel, E. Kraeling, 1918; A History of Palestine and Syria, A. T. Olmstead, 1931; Aram Naharaim, R. T. O'Callaghan, 1948; Les Araméens, A. Dupont-Sommer, 1949.

**Aram, EUGENE** (1704–59). An English schoolmaster and murderer. Born at Ramsgill, Yorkshire, he was the son of a gardener. Entirely self-educated, he had to leave his school at Knaresborough in 1745 under suspicion of being associated with frauds perpetrated by Daniel Clark, a shoemaker, who had secured possession of valuable property and then mysteriously disappeared. Subsequently a man named Houseman was arrested for the murder of Clark, and on his stating that Clark had been murdered by Aram and his body hidden in St. Robert's Cave, Knaresborough, search was made, the skeleton was found, and in Aug., 1758, Aram, then an usher at a school at Lynn, in Norfolk, was arrested. Tried at York, Aug. 3, 1759, with Houseman the only witness against him, Aram defended himself with great skill, chiefly by insistence on the fallibility of circumstantial evidence. He was condemned, and executed on Aug. 6, before his death first attempting suicide, then confessing his participation in the crime, though maintaining that Houseman was the chief murderer. Aram's body was hung in chains at Knaresborough.

In his spare time Aram had acquired amazing knowledge of Latin, Greek, Hebrew, French, Arabic, and Celtic, and he intended to compile a great comparative dictionary. He disputed the then current theory of the derivation of Latin from Greek. To Aram belongs the credit of discovering the

affinity of Celtic to the other Indo-European languages.

The case of Eugene Aram is the subject of Lord Lytton's novel of the same name and of Hood's *Dream of Eugene Aram*. The *Genuine Account of the Life and Trial of Eugene Aram*, by W. Bristow, reprinted 1832, might be found in some libraries.

**Aramaeans.** See Aram.

**Aramaic Language.** Speech of the ancient Aramaeans, and one of the two main branches of the north-west Semitic group of languages, the other being the Canaanite branch. For more than a thousand years Aramaic was the vernacular of Israel, and became a second holy tongue (next to Hebrew) in the religious and literary life of the Jewish people. It was the vernacular of Jesus Christ and the Apostles, and probably the original language of the Gospels. The majority of the religious works of the various oriental Churches are written in dialects descended from Aramaic, in script descended from the Aramaic alphabet.

The two main periods in the development of the Aramaic language are: (1) the early period, represented by inscriptions belonging to the 9th to 7th centuries B.C.; (2) the Aramaic "golden age." The dialects of the second period can be divided into western, comprising Biblical Aramaic (parts of Daniel and Ezra), Palmyrene, Samaritan, the Jewish Targum, etc., and eastern, comprising Syriac, the Babylonian Talmud, Mandaeic, etc.

The loss of Aramaean political independence (see Aram) marked the beginning of Aramaean cultural and economic supremacy in western Asia. The Aramaic language and script were in common use in Assyria from the end of the 8th century B.C. onwards. At the end of the 7th century, all Syria and a great part of Mesopotamia became thoroughly aramaised. Aramaic became the *lingua franca* of the day. Under the Persian Achemenidae it became one of the official languages of the Empire, and for more than a thousand years after the political decay of the Aramaeans it was the principal speech of trade from Egypt and Asia Minor to India. The various languages and dialects which descended from it flourished for many centuries longer, e.g. Mandaeic, Syriac. Despite the unifying force of Arabic and Islam, in some isolated villages, for instance in three villages some



30 miles north of Damascus. Aramaic dialects, though fast losing ground, continued to be spoken into the second half of the 20th century.

Linguistically Aramaic is poorer—particularly in vowel sounds and in grammatical forms—than Hebrew and other Semitic languages, but the variety of its constructions rendered it specially suitable for translation. Consult Aramaic Papyri of the Fifth Century B.C., A. E. Cowley, 1923; Grammatik des Biblisch-Aramaischen, H. Bauer and P. Leander, 1926; The Aramaic of the Old Testament, H. H. Rowley, 1929; The Brooklyn Museum Aramaic Papyri, E. Kraeling, 1953; Aramaic Documents of the Fifth Century B.C., G. R. Driver, 1954.

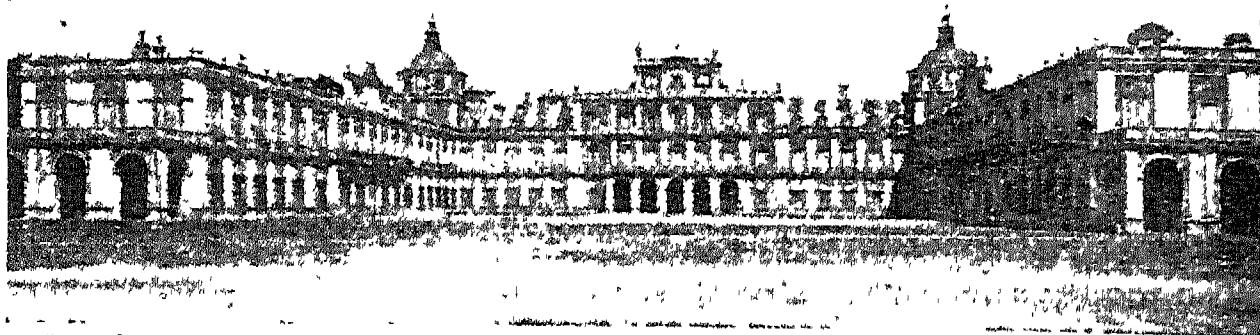
**Aranda**, PEDRO PABLO ABARCA DE BOLEA, COUNT OF (1718–99). Spanish statesman. He served as colonel in the War of the Austrian Succession, and was made governor of Valencia in 1763. In 1766, when Charles III had been driven from Madrid, he sent for Aranda to restore order. As president of the council and captain-general, 1766–73 he carried out administrative reforms, and expelled the Jesuits. Ambassador in Paris, 1773–87, in 1792 he was again prime minister, but his sympathies with the French Revolution led to his dismissal. He died Jan. 9, 1799.

**Arandora Star**. Blue Star liner of 15,305 tons displacement. Built at Birkenhead in 1927, she was reconditioned at Liverpool in 1933 as a cruising ship to carry 375 passengers, making trips to S. America and to Norway. She was torpedoed and sunk by a U-boat off western Ireland on July 3, 1940, while carrying 1,500 German and Italian internees from the U.K. to Canada; 470 Italians and 143 Germans, as well as some of her 500 crew and guards, were lost; survivors were landed at Greenock.

**Aran Islands**. Three small islands of Galway, Irish Republic. Their name is sometimes spelt Arran. They stretch across the entrance to Galway Bay. Area 18 sq. m. The largest and northernmost is Inishmore or Aranmore; the middle is Inishmann; the smallest is Inisheer. The surface ends in precipitous cliffs attaining 354 ft. in Inishmore. Archaeological remains

abound, notably Dun Angus, a remarkable round cyclopean fortress on Inishmore. On this island, still called Aran-na-naomh, or Aran of the Saints, are several shrines and altars of the religious recluses who once inhabited it. Mackerel fishing is the chief occupation; there is also a flourishing knitting industry. Pop. (1953) 2,588.

Aranmore was the scene of Robert Flaherty's film *Man of Aran*, 1934.



Aranjuez. Former royal palace in this ancient city of Spain. It was built by Philip II and altered and enlarged by successive sovereigns

**Aranjuez** (Latin Ara Jovis, Jupiter's altar). Town of Spain, in Madrid province. It stands on the Tagus, 29 m. S.S.E. of Madrid on the rly. The splendid royal palace, built by Philip II and altered and enlarged in the 18th century, has a park famous for its beauty. This well-planned town was the scene of treaties with France in 1772 and 1805, and of the insurrection which caused Charles IV to abdicate in 1808 in favour of his son Ferdinand VII. Pop. (est.) 22,000.

**Aran Mawddwy**. Mt. of Merionethshire, Wales. In the Cader Idris group, it is 2,970 ft. high. To the N. is Aran Benllyn, 2,901 ft. high.

**Arany**, JÁNOS (1817–82). Hungarian poet whose work expressed both the melancholy of his people and the constructive nationalism of the age. Born of peasant stock at Nagyszalonta, he was educated at the college of Debreczen, and became in turn actor, notary, and writer. He won the prize offered by the Kiszfaludy society in 1845 with his satirical epic poem *Az elveszett alkotmány* (the lost constitution), and again in 1846 with the first part of his trilogy *Toldi*.

*Buda halála*, 1864, an heroic epic, was translated into English, 1936, as the *Death of King Buda*. Arany also translated into Magyar plays by Aristophanes and Shakespeare. He became director of the Kiszfaludy society, and secretary of the Hungarian Academy. He died in Budapest, Oct. 24, 1882.

**Aranyi**, JELLY D' (b. 1895). British violinist, a great-niece of Joachim. Born at Budapest, May

3, 1895, she made her first public appearance in Vienna at the age of 14; a European tour followed, which included a visit to London. She settled in England in 1923, becoming a naturalised British subject. She made her American début in New York in 1927. Bartók, Ravel, and Vaughan Williams each dedicated compositions to her. Associated with her was her sister Adila (married name, Fachiri), also a violinist. Their performances of Bach's Double Concerto and their discovery of Schumann's lost Violin Concerto were notable achievements.

**Arapuni**. Hydro-electric generating station in Auckland prov., North Island, New Zealand. It was constructed during 1925–29 to supply all the electrical needs of the Auckland district. The intended full capacity of 180,000 kVA produced by 8 units was reached in 1946. The static head is 175 ft. The station is linked with Mangahao and Waikaremoana.

**Ararat** (Armenian Massis; Turk. Aghri Dagh; Pers. Koh-i-Nuh, mt. of Noah). Double-peaked volcano of Turkey, and the traditional resting place of Noah's ark. It is in Turkish Armenia, near the Persian and Russian frontiers; Great Ararat, is 17,000 ft., Little Ararat 12,900 ft. An earthquake in 1840 dislodged large masses of the mountain and destroyed the village of Arghuri. The first complete ascent was



Ararat. Great Ararat and Little Ararat, the two peaks of this volcano in Turkish Armenia, the traditional resting place of Noah's Ark

made by Dr. Perrot in 1829. Ararat is an ancient name for the whole Armenian region, and in this sense occurs in Assyrian records as Urartu (*q.v.*).

**Ararat.** Town of Victoria, Australia. It stands near Hopkins river, 130 m. by rly. W.N.W. of Melbourne, surrounded by a region given over mainly to growing wheat and rearing sheep. The town has a trade in timber, and the mining of gold, slate, etc., and the making of soap, leather, and bricks are carried on. Pop. (1954) 7,420.

**Aras.** River of Asia Minor, the ancient Araxes. It rises in the Erzerum vilayet, flows E. through S. Caucasia, forms the boundary between Azerbaijan S.S.R. and Persia, and enters the Caspian Sea, partly by a direct channel and partly by uniting with the Kur. It is 600 m. long, and its chief tributaries are Arpa Chai and Kara Su.

**Aratus of Sicyon** (271–213 B.C.). Greek general and statesman. From 245 he was many years general of the Achaean League (*q.v.*), which he strengthened by securing several new states as members. Unfortunately he alienated Sparta, and to secure a counterpoise sought alliance with the Macedonians, depriving the league of its distinctive character as the champion of Greek freedom.

**Arauca.** A town of Colombia. Standing on the Arauca, here bordering Venezuela, it is the capital of the commissary of Arauca (pop. 11,156). The Arauca river is 450 m. long.

**Araucanians** (Quichua, rebels). Group of S. American Indian tribes inhabiting S. Chile. The name indicates their independent character. Long-faced, roundish-headed,

convex-nosed, pale yellow, muscular, averaging 5 ft. 3½ ins. in height, they reproduce in temperate S. America the vigorous type of such northern Amerinds as the Iroquois, at the cultural level of the Navaho. Ethnically akin to the Andean stock, they resisted the Inca domination, although those bordering upon the Peruvian civilization did not escape its cultural influence. They were the only aboriginal people who never submitted to the Latin subjugation. Their first invader, Valdivia, having been slain by them in 1554 (N.S.).

Calling themselves Mapuche, or war men, they recognized such groups as Picunche, or north men, Huilliche, or south men, Moluche, or west men, and—centrally—Pehuenche, or pine men, and an outlying group E. of the Cordilleras are the Puelche, or east men. Their number in Chile is about 100,000. They have never risen to nationhood; when necessity arose a military chief (*toqui*) was elected from each of the four tribal divisions. Their primitive hunting life, with low skin tents for dwellings, has been largely displaced by more settled vocations, including stock-breeding and farming. There are traces of an ancestral totemism, and their animism included a recognition of a thunder-god (*Pillan*). Deceased warriors were interred with their weapons, and their steeds were consumed at funeral feasts, a hereafter in the Milky Way being inculcated. *Caupolicán*, a warlike chief of the Araucanians, offered so fierce a resistance to the Spanish until his capture and cruel execution in 1558 that his name and exploits became legendary, and were made the theme

of a fine Spanish epic, *La Araucana*, by the poet Ercilla. The figure of *Caupolicán*, typifying his race, is a favourite and much copied sculpture in Chile. After an attempt by a French adventurer, Antoine de Tounens, to found an Araucanian kingdom in 1861, the Araucanians formally acknowledged Chilean rule in 1870. See American Indians.

**Arauco.** Coastal province of S. Chile. It comprises much of the former region of Araucania. Area 2,222 sq. m. It has a productive soil,



Arawak. Types of S. American Indians inhabiting British and Dutch Guiana

large forests, and coal deposits. Lebu is the capital. Pop. 66,107.

**Aravali Hills.** Mountain range of India. It extends in a N.E. direction from Gujarat through Rajputana. Its loftiest summit is Mount Abu (5,650 ft.). The hills are the worn-down stumps of an ancient mountain range.

**Arawak.** Tribe of S. American Indians, inhabiting parts of British and Dutch Guiana. These cassava-eaters are forest-dwellers, interposed between the coast Warraus and the inland Caribs. They are a weak-bodied, peace-loving people, who once extended from Bolivia to the W. Indies and Florida, where they were in process of displacement by the Caribs at the Spanish conquest. They use bows and arrows and blow-guns. Their dress is little more than an apron; ornament is furnished by feathers, seeds, and shells. Their primitive animism involves the resort to medicine against unfriendly spirits. See American Indians.

**Arbaces.** Median chieftain. The statement of Ctesias that he revolted against the Assyrian king Sardanapalus, destroyed Nineveh about 876 B.C., and founded the Median empire, is unhistorical. Cuneiform records of that age reveal a place-name Arbaki; later the personal name Arbaku appears. Nabopolassar of Babylon may have had a Scythian ally of this name at the siege of Nineveh in 606. Xenophon mentions a Median satrap Arbaces in the army of Artaxerxes Mnemon at Cunaxa in 401. Arbaces is the name of a character in Lytton's *Last Days of Pompeii*.

**Arbalest** (Latin *arcus*, bow; *ballista*, projectile machine). Ancient weapon, also known as a cross-bow, for discharging short arrows, stones, or bullets, which obtains its power from a spanned bow of spring steel. Suggested, probably,



Araucanians. Statue of the chief Caupolicán, typifying his race. Right: Photograph of Araucanian woman



from a knowledge of the ballista or mangonel, the arbalest seems to have come into use in the 11th century, but is not depicted on any monuments of the time. The Second Lateran Council in 1139 forbade its use in warfare by Christians as being too murderous. It is believed to have been introduced into England by William the Conqueror, but for some years was only used for hunting purposes. It began to assume a position of military importance during the Crusades. In England it was almost completely superseded by the long bow in the 14th century; in most other countries it was displaced by firearmstowardstheendof the 15th. Its last appearance in European warfare was in 1807, against Napoleon in Poland, though the Chinese used it at Taku in 1860.

The majority of arbalests were used as hand weapons, but a few specimens of enormous proportions are known, which were permanently fixed on the walls of castles

powerful to kill a man or horse at 250 paces and had a maximum range of 400 paces.

Even after the introduction of firearms, the arbalest was preferred to the arquebus as being more efficient for military use, while the absence of noise, smoke, and flame was considered a great advantage in hunting even after firearms had been much improved, as it enabled several shots to be fired without the quarry being frightened or disturbed.

**Arbe.** Italian and historic name of Rab, a Yugoslav island in the Gulf of Quarnero (Kvarner), an opening of the Adriatic Sea. It is about 12 m. long. The inhabitants are mainly fishermen and tillers of the ground. Arbe (Rab), the capital, is a picturesque walled town on the W. coast, with an old cathedral, a castle, and other buildings of interest. In the Middle Ages the island belonged to the republic of Venice.

**Arbela** OR ARBAILU (the city of four gods). City of ancient Assyria. It gave its name to the battle in which Alexander the Great finally defeated Darius, 331 B.C. The actual site of the battle is said to have been Gaugamela, about 25 m. N.W. On the site of Arbela stands Erbil, a town of Iraq, 40 m. S.E. of Mosul, capital of a liwa of the same name. Pop. (1947) 239,776.

**Arber**, EDWARD (1836-1912). English editor, chiefly of works previously almost inaccessible to the general public, as in his English Reprints series, 1868-71. He was born in London, Dec. 4, 1836, and died there Nov. 23, 1912. He was professor of English at Mason college, Birmingham, 1881-94.

**Arbitrage.** Term used in stock exchange circles for the relation between the value of a particular stock in one market and its value at the same time in another, say London and Paris. A dealer might be able to buy French Rentes in Paris somewhat cheaper than in London; he does so and sells them in London, and the transaction is called an arbitrage. It is also applied to the buying and selling in a similar fashion of bills of exchange, bullion, etc. The words arbitrage, arbiter, arbitration are derived from Lat. *ad*, to; and *bitere*, to go; thus an arbiter is properly one who goes to see, who is called in to settle a question. See Stock Exchange.

**Arbitration.** In English law, the decision of a matter in dispute, not by a court of law, but by a person called an arbitrator. The general law relating to arbitration

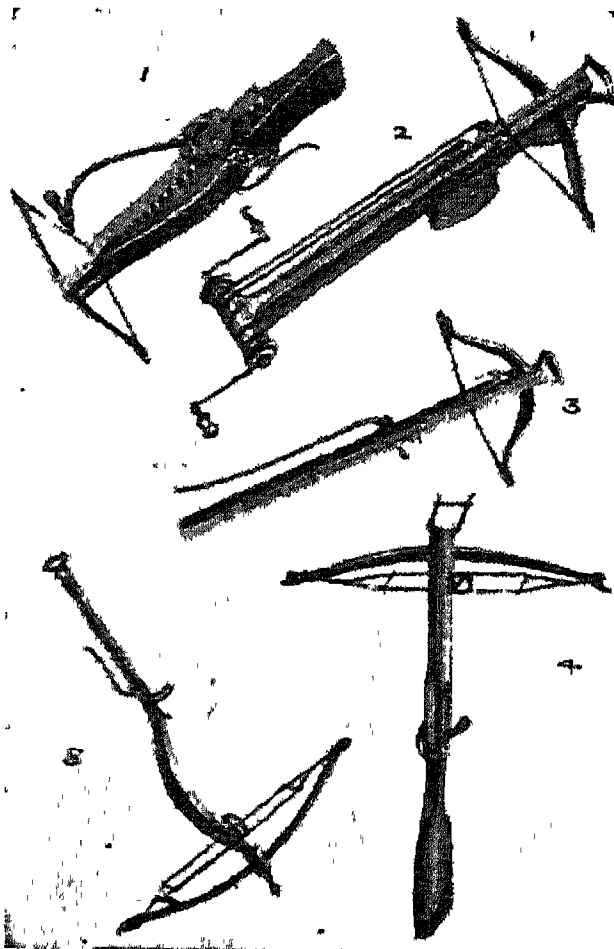
was consolidated by the Arbitration Act, 1950. Arbitration under this act is voluntary. There may also be compulsory arbitration by order of the court.

(1) Voluntary arbitration is where two or more parties have made a *submission* in writing, agreeing to submit a specific dispute, or a class of disputes, or all disputes between them to arbitration. They may agree to have two arbitrators, one appointed by each party. If they do not so agree, a single arbitrator acts, and if the parties cannot agree on one, the court will appoint one. If there are two arbitrators, these two must appoint an umpire to decide, if they should differ. If the arbitrators cannot agree on an umpire, the court will appoint one. If the submission is to two arbitrators, and one party refuses or neglects to appoint his man, the other party should appoint his, and give notice, and if his opponent does not appoint within seven days, the one arbitrator may be appointed sole arbitrator. An arbitrator must not take sides. He is sitting as a judge, and should have no private communications with either party. He must not be interested in the result of the case. He must not make up his mind beforehand. If he does any of these things, or is guilty of any misconduct in the arbitration, he can be removed by the court, and a new arbitrator appointed.

(2) Compulsory arbitration is where the court refers to a special referee, or to one of the official referees, a case involving investigation of complicated accounts, or very numerous items, or scientific or technical matters. The most common of these cases are claims for dilapidations to house property, builders' accounts, claims on engineering contracts, and the like, in which a very large number of small items must be dealt with. An appeal lies from an official referee and from other arbitrators on questions of law.

Certain statutes, e.g. the Friendly Societies Act, provide for the settlement of disputes by arbitration, and arbitration is frequently employed in cases where the price of land required by rly. companies and other public bodies is in dispute.

**Arbitration, INDUSTRIAL.** Method by which disputes between employers and workmen are referred to an independent arbitrator for settlement. Where the submission is made by the actual parties to the dispute, the arbitration proceeds on the same lines as commercial arbitrations in general



Arbalest. 1. Lever arbalest, a cross-bow fitted with a cranequin. 2. Arbalest with windlass and compound pulley-gear. 3. Simple arbalest. 4. Bullet arbalest. 5. Arbalest for stones (16th century)

or towns and discharged arrows 12 ft. long with sufficient violence to pierce the bodies of several men in succession. In all types, after spanning the bow, the string was placed on a catch, whence it was released by pressing the trigger after the missile had been put in position and aim taken, the latter being done as with a modern rifle, except that in earlier types the stock was rested on top of the shoulder instead of being pressed against it.

The ordinary type of arbalest used by hand was sufficiently

and is governed in Great Britain by the Arbitration Acts. Often, however, the dispute arises out of a trade union agreement, the parties to which are associations of employers and workers; in such cases, unless the associations are acting expressly as agents of named and identifiable groups for the purposes of the arbitration, the award is binding only on the associations as distinct from individuals. Another point of difference is that whereas the subject matter of an ordinary arbitration is usually an *existing* contract, industrial arbitrations are commonly concerned with the terms and conditions of *future* contracts of employment.

Industrial arbitration can be (a) compulsory, as operated during the First Great War under the Munitions Act in this country, and as has been the practice in New Zealand since 1894, and Australia since 1904; or (b) voluntary. Since the Whitley committee in 1917 pronounced against compulsory arbitration, the voluntary principle has been the accepted rule in industrial arbitration in the U.K.

As early as the reign of Elizabeth I magistrates were entrusted with special powers for settling labour differences. The Employers and Workmen Act, passed in 1875, was another example of the use of the courts for the purpose. But industrial arbitration proper began with the Conciliation Act, 1896 (itself the result of a Royal Commission of 1891), whereby the Board of Trade was *inter alia* empowered to appoint an arbitrator to determine an industrial dispute on the application of the parties thereto. From 1908 onwards standing panels of independent persons have been maintained for the purpose of constituting courts of arbitration, and in 1916 the Board of Trade's functions in the matter were transferred to the newly formed ministry of Labour.

#### The Industrial Court

The 1896 Act, although still on the statute book, was for all practical purposes superseded by the Industrial Courts Act, 1919 (the consequence of another recommendation of the Whitley committee). The industrial court was thereby set up as a permanent body for the settlement of trade disputes, the members being appointed by the minister of Labour from employers' and workers' representatives, independent persons, and one or more women. The president is appointed by the minister from among the independent members.

The president may call in the assistance of assessors. On a trade dispute being reported to him by either of the parties, the minister may, with the consent of both parties, refer the matter to the industrial court, or to an arbitrator or arbitrators appointed by him, or to a board of arbitrators comprising nominees of the parties concerned in equal numbers, and an independent chairman nominated by the minister. But where arrangements already exist in the trade for conciliation or arbitration the minister may take action only after those arrangements have failed to produce a settlement. There is no compulsion on the parties to accept the decisions of the industrial court, but there have been few cases of rejection, and the cumulative experience of the members of the court in the handling of these disputes has been a decisive factor in the growth of industrial arbitration.

#### National Arbitration Tribunal

The setting-up of a national arbitration tribunal to exercise functions which were to some extent parallel with those of the industrial court was one of the emergency measures of the Second Great War. By the Conditions of Employment and National Arbitration Order (order 1305), 1940 (made under Defence Regulation 58 AA), the national arbitration tribunal was set up, consisting of five persons appointed by the minister, *viz.* three appointed members including the chairman, one representing employers, and one representing workers. Any trade dispute reported to the minister by either party could be referred by the minister to the tribunal where in his opinion no suitable means for settlement existed under a trade union agreement. The order made lock-outs and strikes illegal unless the dispute had been so reported to the minister and the minister had not, within 21 days following the report, referred the dispute for settlement. This provision followed the lines of the Canadian Industrial Disputes and Investigation Act, 1907.

Order 1305 was replaced in 1951 by the Industrial Disputes Order. This contained no prohibition of lock-outs or strikes, but gave the minister discretion to refuse access to the new industrial disputes tribunal set up under the order.

The trade union agreements covering the larger industries almost invariably contain arbitration clauses which often include a

provision for negotiating or for conciliation machinery as the first step towards the settlement of differences, and this practice is now generally adopted in the smaller industries as well. **H. Samuels**

*Bibliography.* Survey of Industrial Relations (Balfour Committee on Industry and Trade), 1926; Towards Industrial Peace (League of Nations Union publication), 1927; Industrial and Labour Relations in Great Britain (I.L.O. publication), 1939; Industrial Relations Handbook, 1953 (Ministry of Labour and National Service).

**Arbitration**, INTERNATIONAL. See under International Law.

**Arblay**, FRANCES D'. Married name of the British novelist known as Fanny Burney (*q.v.*).

**Arboga**. Town of Sweden, in the co. of Vestmanland. It stands on the Arboga, 25 m. by rly. N.E. of Orebro, and has communication with Lakes Malar and Hjelmars by river and canal. The town was important in the Middle Ages, and diets were held there, notably those of 1561 and 1597, as were several church assemblies. The church has a Rembrandt altar-piece. Pop. (1954) 10,217.

**Arbogast** (d. A.D. 394). Frankish general. Under the emperors Gratian and Valentinian II he was in the Roman service and distinguished himself by victories over the Goths and by overthrowing the usurper Maximus. He is said to have contrived the murder of Valentinian in 392 and set up Eugenius, a puppet of his own, as emperor. Theodosius, the emperor of the East, then intervened; Italy was invaded, and Arbogast was defeated on the river Frigidus, near Aquileia, in 394, and soon afterwards put an end to his life.

**Arboriculture** (Lat. *arbor*, tree; *cultura*, cultivation). In its widest sense, the cultivation of trees; more popularly, the culture of trees for ornament. (Planting in large quantities for timber is forestry, *q.v.*) The planting and maintenance of standard fruit trees, such as apple, plum, pear, is an important branch of arboriculture.

John Evelyn's *Sylva*, published in 1664, rendered great service to arboriculture, and inspired many ornamental plantations in England.

**Arbor Low**. Prehistoric sanctuary near Bakewell, Derbyshire. It was built by the Beaker People just before the dawn of the Bronze Age. A circle of great stones (megoliths), now overturned, surrounded a central structure. Outside the circle there is a rock-cut ditch,



and beyond that there is a bank through which there are two entrances. The term *low* (O.E. hill) refers to an adjacent round barrow of the Bronze Age.

**Arbor Vitae** (Lat., tree of life). Popular name for cypress-like evergreen coniferous trees, of which the principal species are the American (*Thuja occidentalis*) and the Chinese (*T. orientalis*). The leaves, in opposite pairs, are reduced to minute scales which overlap one another and are closely pressed to the twigs and branches. Their under-surface is coated with wax, which gives it a whitish appearance. Both species have a strong aromatic odour.

**Arbroath** OR ABERBROTHOCK. A royal burgh and seaport of Angus co., Scotland. It stands in rich agricultural country on the Brothock, near its mouth, about 17 m. N.E. of Dundee. Industries include shipbuilding and ship repairing, flax spinning, engineering, fishing, and the making of sail-cloth and linen. The harbour is accessible to vessels of 1,000 tons. Arbroath is famous for haddocks caught and cured locally. There are ruins of the abbey where in 1320 the estates of Scotland declared the country independent of the English king Edward II. Market day, Sat. Pop. (1951) 19,511. Arbroath is the Fairport of Scott's novel *The Antiquary*.

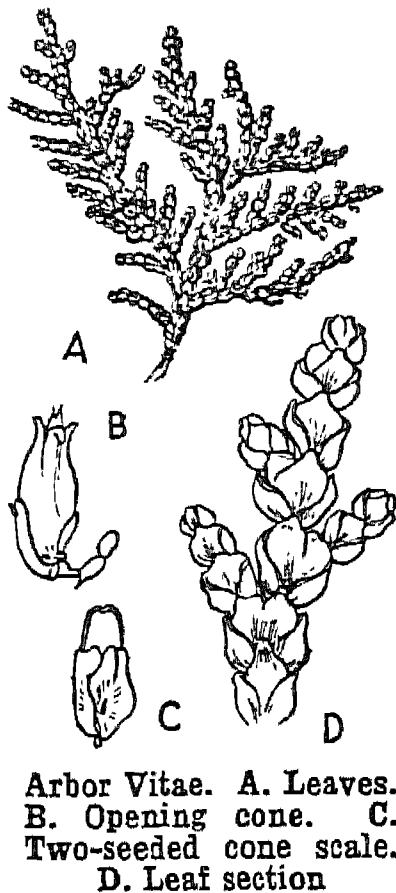
**Arbues**, PETER (1441-85). A Spanish inquisitor. He was born at Epila, in Aragon, studied at Bologna, and then became a canon regular at Saragossa. In 1484 he was appointed chief inquisitor of Aragon, and his severity to the Marranos, Jews who after receiving baptism returned to Judaism, provoked continued and violent retaliation. He was stabbed by hired assassins in the cathedral of Saragossa, and died two days later, Sept. 17, 1485.



John Arbuthnot,  
British author

Regarded as a martyr in Spain, he was canonised by Pope Pius IX in 1867.

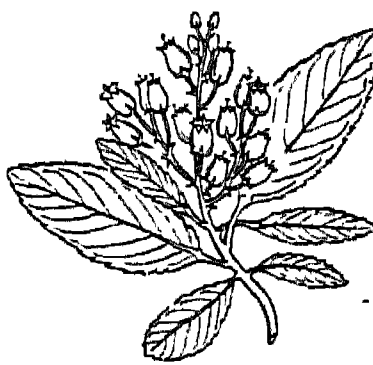
**Arbuthnot** JOHN (1667-1735). British physician and author. Born at Ar-



Arbor Vitae. A. Leaves.  
B. Opening cone. C.  
Two-seeded cone scale.  
D. Leaf section

butnot was the author of the political satire, *The History of John Bull*, 1712, and wrote much if not all of *The Memoirs of Martinus Scriblerus*, published among Pope's works, 1741.

**Arbutus**. Genus of evergreen trees and shrubs of the family Ericaceae, native to the N. temperate regions. They have alternate leaves, and bell-shaped or globular white or reddish flowers in clustered sprays. The strawberry tree (*A. unedo*) is a native of S. Europe and West Ireland. It grows to 10 or 12 feet, and has red-tinged, scaly bark. The alternate oval leathery leaves have toothed edges, and the creamy, bell-shaped flowers droop in clusters. The fruit is a round orange-red berry, whose entire surface is raised into little points. It takes over a year to develop fully and ripen, when it is edible but not very desirable, except as a preserve. Madrona (*A. menziesii*), of N. America, produces useful timber.



Arbutus unedo,  
the strawberry-tree

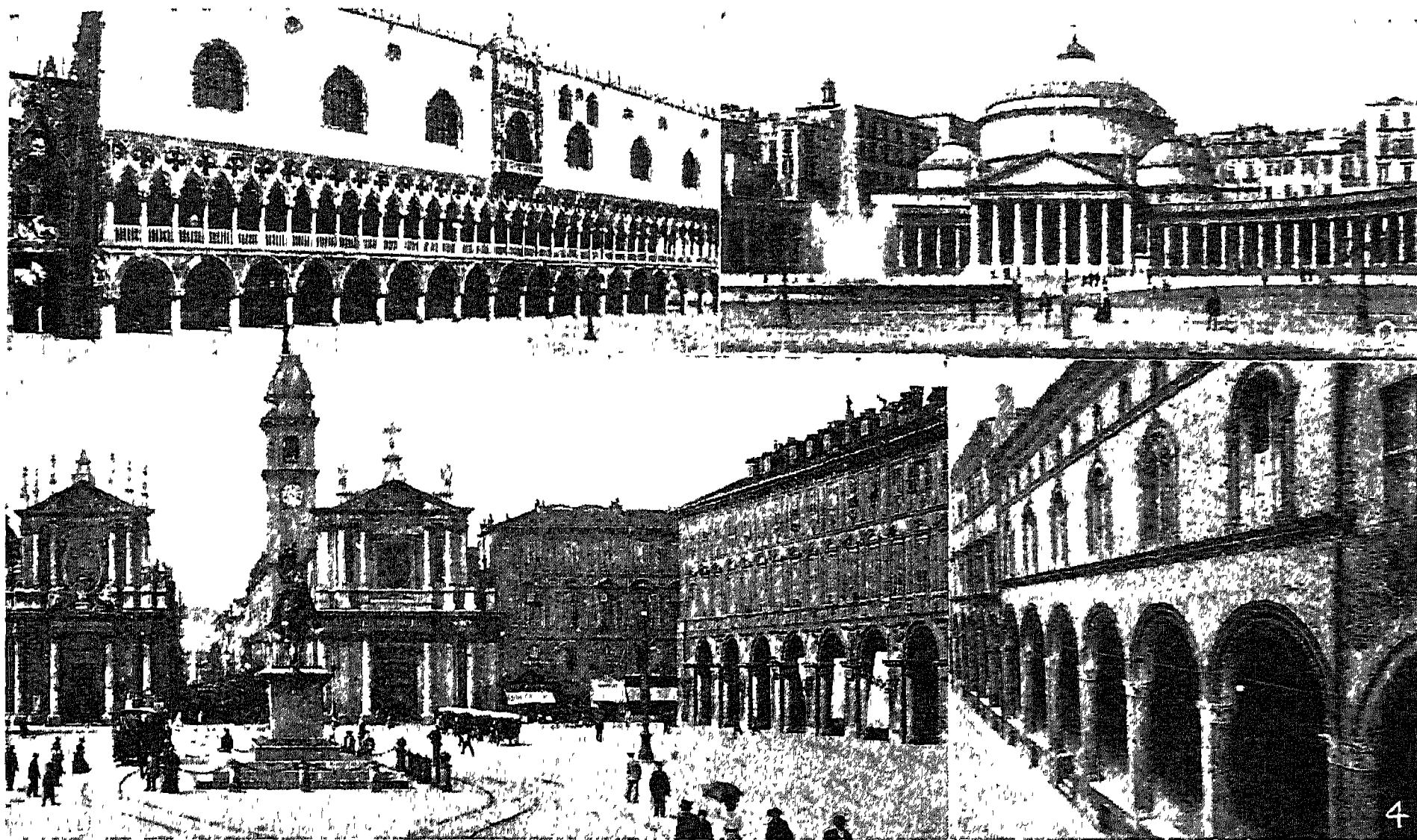
**Arc**. In geometry, part of the circumference of a circle. More generally, any curve which joins two points and does not intersect itself. An arc is said to be rectifiable if it is possible to assign to it a length.

In electricity, an arc is a particular instance of the passage of electricity through a gas. It is characterised by: (1) a high current and a low voltage drop between electrodes; (2) the presence of electrode material in the

gap, and hence the emission of spectral lines characteristic of the electrode material; (3) extremely high temperatures, and hence the emission of intense white light. The mechanism of conduction is not fully understood, but it is believed that the bombardment of the negative electrode on cathode by positive ions produces cathode temperatures sufficiently high to cause thermionic emission of electrons. These in turn bombard the positive electrode (anode) ejecting atoms, a process called sputtering. Some of these atoms are ionised in the gap by collisions with the electrons emanating from the cathode, and this produces the positive ions necessary to sustain the discharge. An arc is initiated either by applying a sufficiently high voltage to the gap to cause a spark which then goes over into an arc if the external impedance is low enough; or by separating two electrodes through which a large current is passing.

**Arcachon**. Town of France, in the department of Gironde. Standing on the Bassin d'Arcachon, a shallow opening of the Bay of Biscay, it is 34 m. by rly. S.W. of Bordeaux. Formerly a fishing village, in the middle of the 19th century it became a successful seaside resort. The mildness of its climate and the pine woods that clothe the dunes encircling the town make it a restful as well as an enjoyable spot. Its broad smooth sands afford excellent bathing, and Arcachon provides also fishing and aquatic sports. It has extensive oyster beds, the most important of France for young oysters which are sent to other centres to be developed. Pop. (1954) 14,985.

**Arcade** (Lat. *arcus*, bow, arch). Range of arches standing on piers or columns, either free-standing or attached as decoration to the surface of a wall. As a decoration of a wall, the arcade was a feature, though a rare one, of Greek architecture. On the S. side of the Acropolis at Athens there is a wall composed in part of piers and arches which dates from the time of Eumenes II, king of Pergamum, 197-159 B.C. The arcade, however, like the arch, assumed no real importance until Roman times. By the Romans it was transmitted to the medieval Italians, and Italian cities are rich in this feature. In Venice, Bologna, Naples, Turin, and other towns there are many streets of houses the fronts of which rest on high picturesque arcades.



Arcades. 1. Front of the Ducal Palace at Venice, showing its beautiful double arcade, that on the ground, and that of the gallery above it. 2. Arcaded front of the church of S. Francesco di Paola, at Naples, the pillars of which are like those of a classic colonnade. 3. Arcade, to the right, of the Piazza S. Carlo at Turin. 4. Palazzo Fava at Bologna

Arcades are usually built round public courts or squares, market places, and in other situations where they can serve a distinct utilitarian purpose. It is in ecclesiastical architecture principally that they have been transformed into objects of beauty. The nave arcades of many Romanesque and Gothic cathedrals are frequently their chief architectural feature. The cushion capital, which enabled the Byzantine builders to spring their arches directly from the piers or columns, was afterwards adopted eagerly by the Romanesque and Gothic architects, and arcades of this character are the most graceful. Medieval church architecture abounds in instances of the arcade as an ornamental dressing to the wall, taking the form of moulded arches supported by colonnettes. A more modern application of the term is to glass-roofed streets of shops, *e.g.* the Burlington Arcade, London, or those in many seaside resorts.

**Arcadia.** Country of ancient Greece. It occupied the centre of Peloponnesus, and was completely cut off from the sea by Achaea on the N., Argolis on the E., Messenia and Laconia on the S., and Elis on the W. A very mountainous country, its physical characteristics enabled the inhabitants continuously to preserve a semblance of independence. It was extremely well watered. The Stymphalian lake (mod. Zaraka) was the fabled home of the terrible Stymphalian birds, whose destruction by Her-

cules was one of the hero's Twelve Labours. Its waters were conveyed to Corinth by an aqueduct constructed by Hadrian. The chief towns were Mantinea, Tegea, and Orchomenus. According to ancient tradition the inhabitants were racially the oldest in Greece. They were devoted to pastoral pursuits and fond of music; hence the poetic identification of Arcadia with romantic simplicity. Originally governed by kings, Arcadia was later divided into independent republics such as Mantinea and Tegea. After the battle of Leuctra in 371 B.C., Epaminondas formed an Arcadian League with a new city, Megalopolis, as its capital, but the league was of short duration. The modern Arcadia forms a division of Greece, and has an area of 2,020 sq. m. Pop. (1951) 154,318.

**Arcadia.** Name of several pastoral romances, written partly in prose and partly in verse. All owed something directly or indirectly to the Greek romances of Heliodorus (3rd century A.D.) and Achilles Tatius (3rd century A.D.). The Arcadia of the Italian poet Jacopo Sannazaro appeared in 1504; that of Robert Greene, 1599, was first published as *Menaphon*, or *Camilla's Alarum to Slumbering Euphues*, in 1589; and the most notable of all, that by Sir Philip Sidney, appeared originally in 1590.

Sidney's work, one of the foundation books of English literature, was written for his sister, and called *The Countess of Pembroke's*

*Arcadia*. Its composition was influenced by Sannazaro's *Arcadia* and the *Diana* of the Portuguese Spaniard Jorge de Montemayor. In turn its influence was reflected in Shakespeare's *King Lear* and *The Two Gentlemen of Verona*; Beaumont and Fletcher's *Cupid's Revenge*; John Day's *Ile of Guls*; James Shirley's pastoral, *Arcadia*; Francis Quarles's *Argalus and Parthenia*; and the writings of Samuel Richardson, Sir Walter Scott, and others. It is recorded that Charles I read *The Arcadia* while in prison.

## THE COVNTESSE OF PEMBROKES ARCADIA,

WRITTEN BY SIR PHILIPPE  
SIDNEI.



LONDON  
Printed for William Perforbie.  
Anno Domini, 1590.

*Arcadia.* Title-page of the first quarto edition of the Countess of Pembroke's *Arcadia*, by Sir Philip Sidney



A first draft, in five books, was circulated in MS. The first printed edition, 1590, perhaps edited by Fulke Greville, ends where the author left his revision, in ch. 29 of Book III. In 1593 another edition was issued with preface by Henry Sandford, the earl of Pembroke's secretary. Twelve editions came out between 1593 and 1674, with additions by Sir W. Alexander (1621), R. Beling (1627), and others. Translated into French 1625, and German 1629, it was modernised by Mrs. Stanley, 1725.

As first written, *The Arcadia*, which is interspersed with poems, some of great beauty, formed, says Bertram Dobell, a complete and coherent story with a well-conceived plot, which the revision lacks. Sidney is usually identified with the character of Philisides; Penelope Devereux with Philoclea.

**Arcadia**, GULF OF. Opening on the W. coast of the Morea, Greece. It lies between Cape Katakolo and Cape Konello, 35 m. apart.

**Arcadians**, THE. A "fantastic musical play" by Mark Ambient and A. M. Thompson, with music by Lionel Monckton and Howard Talbot. Produced at the Shaftesbury Theatre, London, April 28, 1909, it had an unbroken run for more than two years. The musical score is notable for such well-known songs as *The Pipes of Pan* and the lugubriously amusing *I've Got a Motto*.

**Arcadius** (c. A.D. 377-408). First East Roman emperor. Elder son of Theodosius the Great, on the division of the empire at his father's death in 395 he received the eastern part and his brother Honorius the western. Arcadius

played a subordinate part, the real rulers being the prefect Rufinus, who was murdered in 395, the eunuch Eutropius, executed in 399, and Eudoxia, the emperor's consort, who died in 404. The Goth Gainas held the chief power 400-2, and on his death Aurelian, the pretorian prefect. The banishment in 404 of the patriarch S. John Chrysostom for his outspoken sermons against the vices of the imperial court established the supremacy of the emperor.

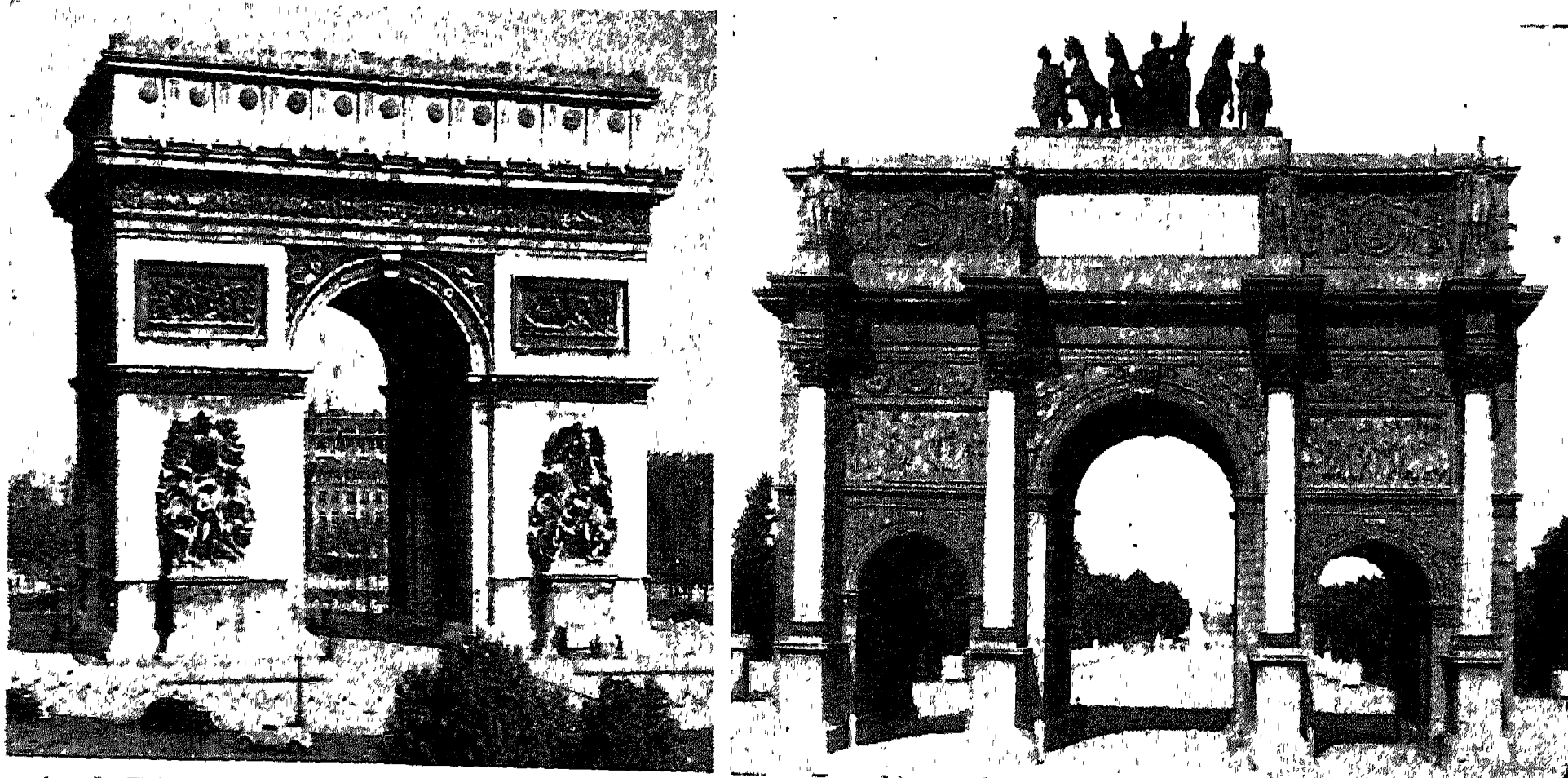
**Arcanum** (*arcere*, to shut up). Latin word meaning a secret or mystery. It is generally used in the plural, *arcana*, which in the 17th and 18th centuries was often treated as a singular, with plural *arcanas*. The term was applied by the alchemists to the secrets of nature, and especially to wonder-working remedies and preparations. The great arcanum was the secret of transmuting base metals into gold. See *Alchemy*.

**Arc de Triomphe**. Name of two arches in Paris commemorating the Napoleonic triumphs of 1805-6. The Arc de Triomphe de l'Étoile (triumphal arch of the star) was begun by Napoleon from designs by Chalgrin, and completed by Louis Philippe. Standing in the centre of the high Place de l'Étoile, at the W. end of the Champs Élysées Avenue, this structure is 162 ft. high, 147 ft. wide, and 73 ft. deep, and has a number of fine sculptures on its façades. There is a spacious view of Paris from the top of the arch, to which the public is admitted. After the French defeat in the Franco-Prussian war of 1871 the archway gates were closed until

Marshal Foch led his armies through in the victory march of 1919. Later the body of an unknown French soldier of the First Great War was buried under the arch and a flame kept perpetually burning at the head of the tombstone. The Arc de Triomphe du Carrousel (triumphal arch of the tilting-yard) is at the E. end of the Tuileries Gardens, and, though much smaller (48 ft. high and 63½ ft. wide), is more beautiful.

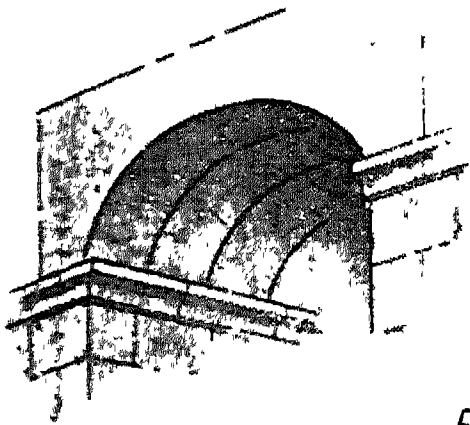
**Arcesilaus** (316-241 B.C.). Greek philosopher and founder of a philosophic school called the Middle Academy. This school taught that absolute knowledge about anything was impossible, and that probability was the nearest it was possible to attain.

**Arch**. Term used in architecture to denote a structural member spanning vertically an opening or recess. Mechanically, it is an assemblage of pieces arranged over the opening in such a way that the vertical pressure of the load carried becomes two lateral pressures on the abutments. An arch is composed of a crown with two supporting flanks, known as haunches or reins, the width between which is called the span. It is divisible into two main species, round and pointed, as exemplified by the Roman and the Gothic, but there are many varieties of each. The chief forms of round arch are the semi-circular, horseshoe, segmental, and elliptical. Pointed arches include the lancet, four-centred Tudor, the fantastic ogee arch, the trefoil, cinquefoil, and polyfoil arches, and the "rampant" arch, of which the impost on one side is higher than that on the other. The materials

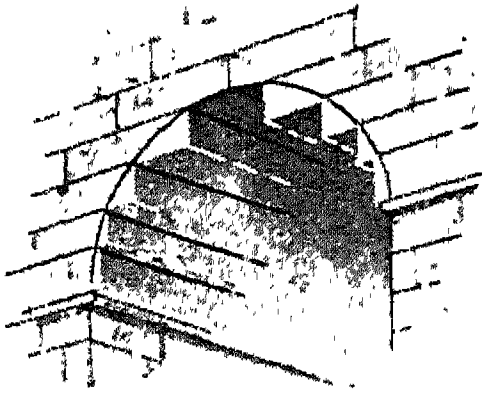


Arc de Triomphe and (right) Arc de Triomphe du Carrousel, Paris. These arches were erected to commemorate Napoleon's triumphs in 1805-6. The former, also commemorating the successes of the Revolutionary army, is noted for its sculptures

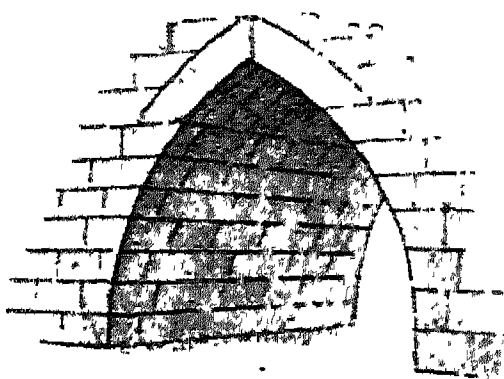
*Vaulted ceiling formed of deep blocks of stone placed side by side on edge. From the Temple of Seti I. Egypt*



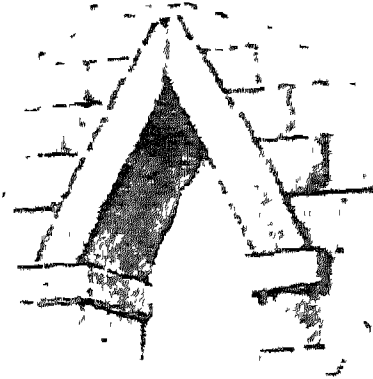
*Vaults constructed with long blocks of stone laid horizontally projecting over each other. The lower angles of the courses (shown in white) were then cut away. From Thebes*



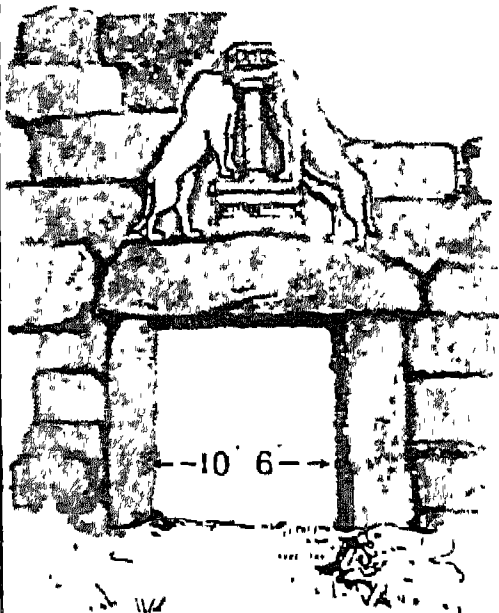
*Etruscan pointed arch from the aqueduct at Tuaculum*



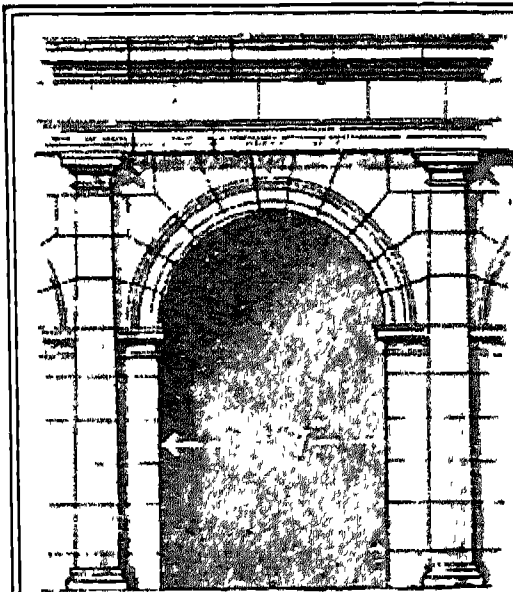
*Angular arch of the Saxon period (England)*



## FIVE TYPES OF EARLY ARCHES



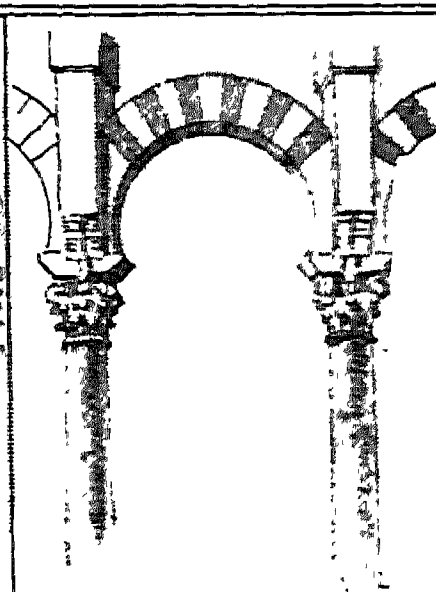
*The Lion's Gate, Mycenae illustrating the lintel or flat arch*



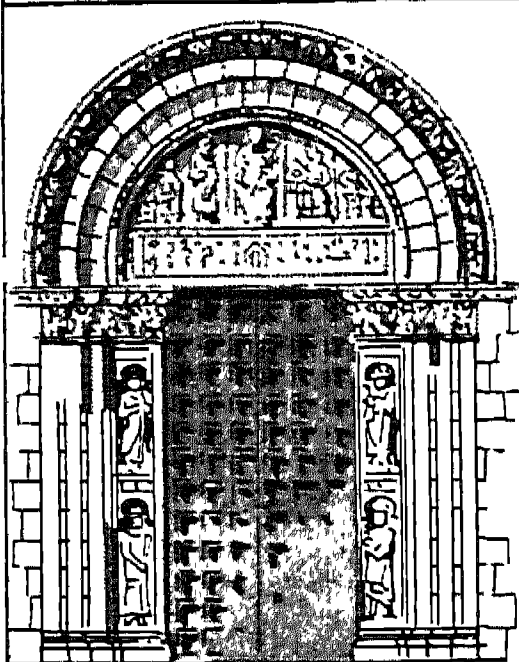
**ROMAN**  
*The Colosseum Rome*



**BYZANTINE**  
*St. Sophia Constantinople*



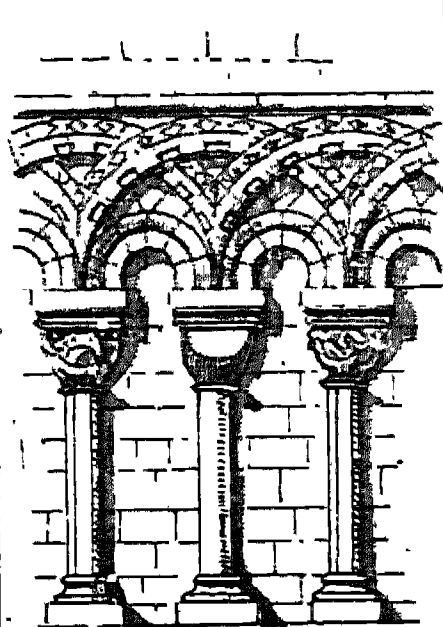
**MOORISH**  
*Mosque of Cordova*



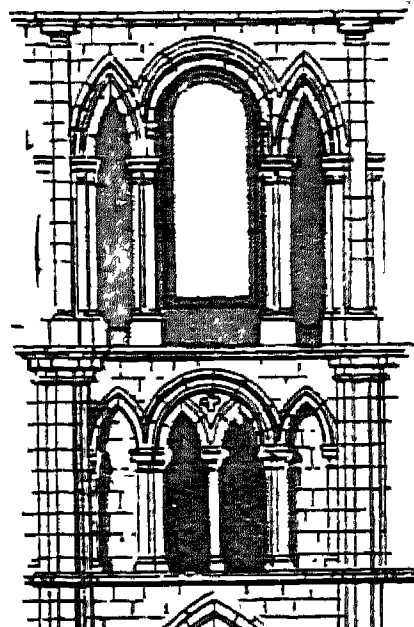
**ROMANESQUE**  
*St. Clemente Church Rome*



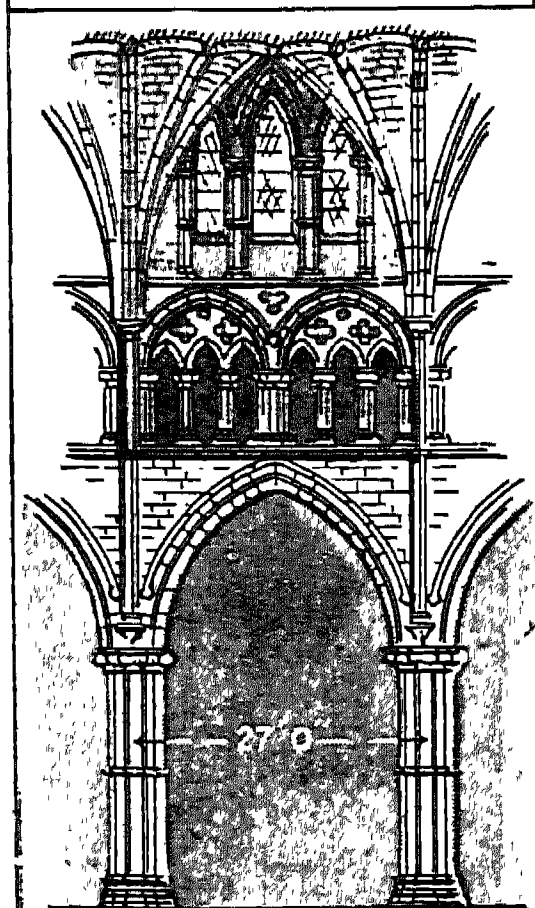
**NORMAN**  
*St. Ebbe's Church, Oxford*



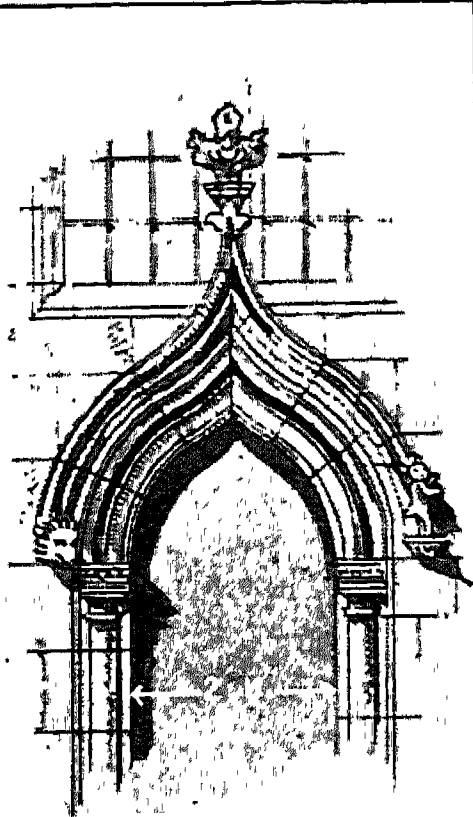
**NORMAN**  
*Canterbury Cathedral, interlacing arches suggesting pointed arch*



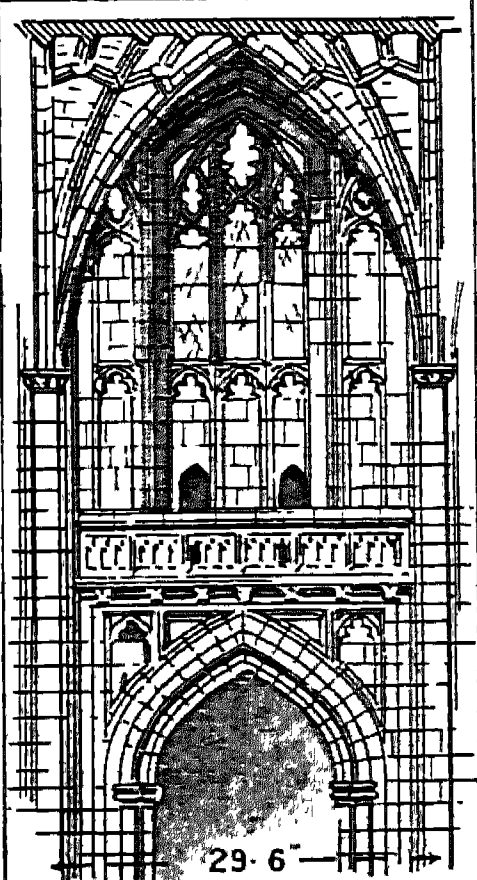
**TRANSITIONAL**  
*Ripon Cathedral*



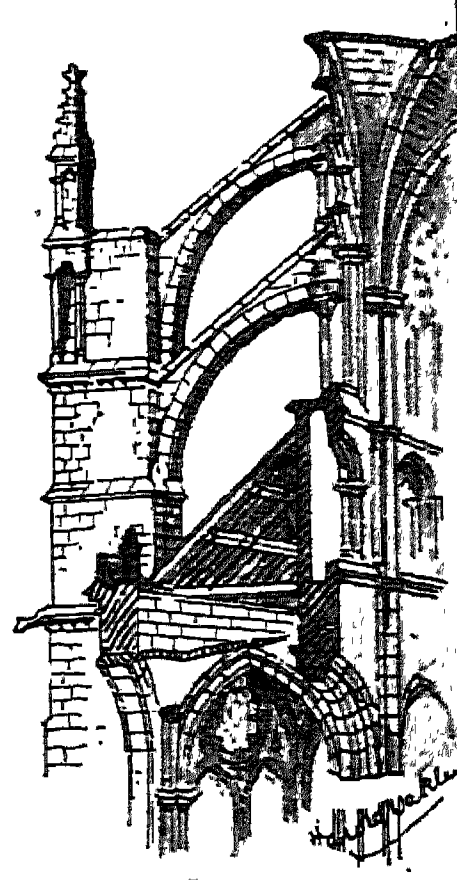
**EARLY ENGLISH**  
*Lincoln Cathedral Nave*



**DECORATED**  
*St. Mary's Church, Beverley*



**PERPENDICULAR**  
*Winchester Cathedral*



**FLYING BUTTRESSES**  
*Amiens Cathedral*

## ARCHES IN THE ARCHITECTURE OF MANY AGES AND PEOPLES



of which an arch is composed are called voussoirs; the inner side of the arch is known as the intrados, and the outer side as the extrados. The keystone is the brick or block of other material occupying the centre of the crown, and the springer, or springing stone, is that placed immediately over the impost.

Historically, the arch is identified with Roman building though the Romans were not the originators. Just as the Greeks took the lintel and post construction from the Egyptians, and developed it in their own manner, so the Romans adopted the arch from the earlier Etruscan architecture. The arch was not unknown either to the Egyptians or to the Greeks after the time of Alexander; the elliptical arch form and even the pointed arch were used by the former, though only for strictly utilitarian purposes. In the same way the Chaldeans and Assyrians employed the arch for bridging the Mesopotamian rivers. In Roman hands, however, its use marks a definite break with the Greek building tradition of horizontal and vertical lines. The Romans confined themselves almost exclusively to the semi-circular arch. The Colosseum at Rome and the public baths erected by successive emperors show the use of the arch in combination with the column and lintel, by means of which Roman architecture still preserved its connexion with the Greek. But whereas in Greek work the columns are real supports, carrying the entablature, in Roman they are mainly decorative attachments to the face of piers carrying the arches.

**TRIUMPHAL ARCHES** A peculiarly Roman product was the triumphal arch. These arches were generally erected to commemorate a victory, but occasionally with other objects, e.g. as entrances to towns or great market places. Some consisted of a single arch, such as the Arch of Titus; others of three arches, a large central opening for chariots and two flanking ones for foot passengers. The Arch of Septimius Severus is generally considered the best of the latter kind, but much of the detail of the Arch of Constantine is excellent. At one time there were thirty-eight of these triumphal arches in Rome alone. There are also arches at Beneventum and Ancona, both in honour of Trajan, while outside of Italy the Arch of Marcus Aurelius at Orange, France, is one of the best known. Roman triumphal arches, however, were scattered far and wide through Europe and North Africa. The triumphal arches erected by Napoleon, and the Marble Arch leading

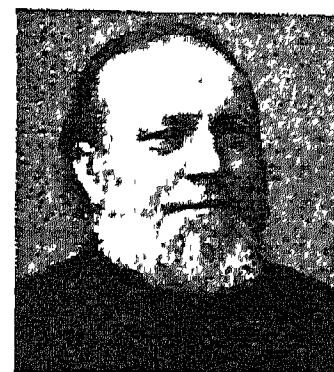
into Hyde Park, London, are all based on Roman models.

**BYZANTINE AND NORMAN ARCHES.** In Byzantine architecture the round arch was further developed in conjunction with the column. The Roman builders had used column and capital as embellishments to the arch rather than as structural necessities. The Byzantines, by inventing the cushion capital, enabled the column to be used as the direct support of the arch. Further, they extended the arch principle in the direction of the vault and the dome. The Mosque of S. Sophia at Constantinople, the last word in Byzantine building, illustrates the strength and beauty achieved by the application of this principle. The round arch was kept alive by the Romanesque builders and when the Gothic pointed manner had spent its force, was revived by the Renaissance architects. Meanwhile the Norman style, a derivative of Romanesque, had received its great impetus in Britain. Norman arches are nearly always semi-circular and plainly moulded, the exceptions being the entrance arches to great churches such as Ely Cathedral, which are profusely ornamented. Different varieties of the round arch are found in Moorish architecture. Here the horseshoe form is a favourite one. The Alhambra and other Moorish remains in Spain provide countless examples. The horseshoe arch frequently occurs in Buddhist architecture, where it is better known as the lotus-leaf arch.

**THE POINTED ARCH.** Though not unknown in the early Egyptian and Etruscan civilizations, this obtained no considerable footing in western Europe until the 10th century. It had a religious significance long before it was adopted as a useful architectural contrivance. To the Christian it expressed the aspiration of the human soul to heaven; to the Brahman it symbolised the clasping of hands in prayer. Hence it figures very conspicuously in the religion-inspired architecture of both East and West. In Europe, the history of the pointed arch is contained in that of the Gothic cathedrals. The lancet form of pointed arch has given its name to the first period of English Gothic, that of the 13th century. The lancet is the keynote of the design of Southwark Cathedral; and in the succeeding Decorated and Perpendicular periods the pointed arch determined absolutely the structure and the form of the building. The secular architecture of the Tudor period gave less scope for its employment, but it persisted in the Tudor arch, the four-centred

arch which is found in the old gatehouse to Lincoln's Inn, and in certain other London and provincial buildings. To-day the popularity of the Renaissance style demands the employment of the round arch except in church building, where a section of opinion still favours the Gothic. See *Architecture*; *Archivolt* (illus.); *Building Bibliography*. Encyclopedia of Architecture, J. Gwilt, ed. W. Papworth, 1867; History of Architectural Development, F. M. Simpson, 1905-11; Byzantine and Romanesque Architecture, T. G. Jackson, 1913; A Handbook of Greek and Roman Architecture, D. S. Robertson, 1929.

**Arch, JOSEPH (1826-1919).** British labour leader. He was born Nov. 10 1826, at Barford, Warwickshire, the son of an agricultural labourer, and trained himself by reading and as a local preacher among the Methodists to become the organizer and leader of his



Joseph Arch,  
British labour leader  
*Elliott & Fry*

fellow labourers in their struggle for better social conditions. Not until 1872 was he able to establish a nation-wide union of agricultural labourers. Arch's influence endured in the eastern counties, and he was elected Liberal-Labour M.P. for N.W. Norfolk, 1885, 1892, and 1895. In 1900 he retired from public life to a cottage at Barford, where he died in his 93rd year, Feb. 12, 1919. Consult autobiography, 1898.

**Archaean** (Greek *archaios*, ancient). Name applied to ancient pre-fossiliferous rocks. They occur beneath those of the Cambrian system, and are therefore synonymous with Pre-Cambrian. Usually the term is restricted to a series of gneisses, schists, and intrusive rocks that form the oldest recognizable portion of the earth's crust.

**Archaeological Association, BRITISH.** Society for the study of archaeology. Founded in 1843 for promoting the study and preservation of antiquities, it holds itinerant annual congresses in May. The offices are at 11, Chandos Street, London, W.1. It controlled the first issues of The Archaeological Journal, afterwards taken over by The Royal Archaeological Institute of Great Britain and Ireland, 1843. The Cambrian Archaeological Association dates from 1846.

## ARCHAEOLOGY: RECREATING THE PAST

Olwen Brogan, M.A., F.S.A., Author of *Roman Gaul*, etc.

*This outline deals with the growth of archaeological methods and the aims of the trained investigator. The actual achievements are described under such headings as Aegean Civilization; Assyria; Babylonia; Crete; Egypt; Palestine; Ur; Verulamium*

Archaeology (Gr. *archaios*, ancient; *logos*, science) is the study of the material remains of man's past. In its widest sense, archaeology covers equally the examination of the earliest stone hand axes and the survey of a medieval cathedral. It interprets the ruins or buried remains of earlier ages of mankind. It is of paramount importance as the means of revealing societies of which no literary knowledge exists, such as that of Cave Man or the Mayas, but it can also add enormously to knowledge of civilizations, such as that of the Roman Empire, of which there are historical records. Or it may be the means of revealing forgotten languages and vanished documents.

**MAKING AN ARCHAEOLOGICAL SITE.** One of the first questions that occurs to a visitor to an excavation is: "How did this town, house, or fortification get covered up?" Only rarely have there been catastrophes such as the eruption of Vesuvius which buried Pompeii and Herculaneum in A.D. 79. The primary maker of ruins is man himself. Many cities have been destroyed or burned down in war, and once the roof is off a building its fabric is exposed to the weather and decay sets in.

But man's work does not end in the making of ruins. It is far easier to take stones from old buildings than to quarry new ones, especially if one's tools are pre-20th century, and in all countries the main agents in the disappearance of brick and stone buildings have been later builders. So the monks of St. Albans used bricks from the Roman city of Verulamium to build their abbey, and in Rome the nobles of the Middle Ages took stones from the Colosseum to build their palaces. The rank vegetation of the north or the tropics, the blown sand of drier areas, continue man's work. Creeping plants undermine brick and stone, walls fall down, weeds and earth gather about the mound of rubbish, and the ruins gradually disappear from sight and so at last from memory.

### Results of the Use of Mud-brick

In the Near East there is another potent factor in the creation of an archaeological site—the widespread use of mud-brick. Structures of mud-brick collapse

into shapeless heaps of earth if left uncared for and unprotected from wind or rain. The bricks cannot be re-used, so many ancient and modern eastern towns stood or stand on artificial hills formed of a succession of mud-brick towns, each one built over the remains of the previous ones. These eastern sites (called *tells* in Arab countries) are not of course confined to ruins of mud-brick; tells also accumulate in the course of ages by the building, ruining, and rebuilding of stone cities, but in the majority the lesser dwellings at least tend to be of mud-brick, while in Babylonia, where stone was rare, almost all buildings were of mud-brick, burnt brick being only rarely used. Besides Babylon and Ur, notable examples of tells are those of Jericho, Kuyunjik at Nineveh, and Troy.

**HISTORY OF ARCHAEOLOGY.** Archaeology is a study whose principles have developed slowly. The history of archaeology may be said to date from 1763, when work on a considerable scale began at Pompeii. For long, however, it had been customary to seek ancient objects of art for the private collections of kings and rich men. But this, even if it involved some digging, was collecting, not archaeology: the Renaissance popes had the ruins of Rome searched for art treasures and thus built up the famous collections of the Vatican; in the early years of the 19th century Lord Elgin explored Greece for sculptures and removed from the Acropolis the sculptures (afterwards called the Elgin Marbles) which found a place in the British Museum.

### The Rosetta Stone

The end of the 18th century was marked by Napoleon's campaign in Egypt and the discovery of the Rosetta Stone in 1799, while a fort was being built near Alexandria. This stone, dating from c. 200 B.C., is inscribed in hieroglyphics, demotic (a later form of Egyptian writing), and Greek. It fell into British hands in 1801 and was taken to London. After long and careful study by scholars of many nations, and comparison with other known inscriptions, it was deciphered by the Frenchman Champollion (1790–1832) in 1822. Here was a key to

unlock the mysteries of the inscriptions of the ancient Egyptian tombs and temples and to give a tremendous impetus to the development of Egyptology.

The early history of Egyptology is a melancholy chronicle of tomb-robbing and vandalism. At last, in 1858, the Egyptian Service of Antiquities was created and Mariette (1821–81) was made director, with the sole right of conducting excavations in the country. He persuaded the khedive to found the National Museum of Antiquities and laid the foundations of its collections. After his death, Maspero (1846–1916) became director, and foreign archaeological societies were allowed to send expeditions to Egypt. Among the many eminent scholars who then set to work was Flinders Petrie (1853–1942) who, after earlier experience at Stonehenge, began to excavate at Tanis in 1885.

The exploration of the ancient cities of Mesopotamia was begun by a British resident in Bagdad, C. J. Rich, who visited Babylon in 1811. Botta, the French consul in Mosul, began digging on the site of Nineveh in 1842. From 1845–47 Henry Layard (1817–94) excavated at Nimrud (Calah), discovering the palaces of Ashurnatsirpal and Shalmaneser. The resultant harvest found its way to the Louvre and the British Museum, where the superb Assyrian sculptures were the wonder of all beholders; of even greater value were the vast quantities of inscribed clay tablets collected by Layard and later excavators.

### Decipherment of Cuneiform

The decipherment of the cuneiform writing on the tablets was not achieved until 1857. Ten years previously H. C. Rawlinson (1810–95) had copied and studied a long inscription set up by the Persian king Darius I at Behistun c. 515 B.C. This is in the cuneiform characters of the three languages Old Persian, Elamitic, and Babylonian. Rawlinson, who was a master of Oriental languages, managed in time to decipher the Persian and Babylonian, thus bringing into being the study called Assyriology, which at once acquired a great hold on the public imagination because of its close connexion with Biblical history. In 1877 the Frenchman De Sarzec dug a mound (Telloh), which proved to be the Sumerian city of Lagash, and it was realized that beneath the Babylonian civilization there was a pre-Semitic civilization



stretching back into and beyond the third millennium B.C.

The collector had been first in the field in classical lands, amassing Greek, Roman, and Etruscan treasures, and it was long before systematic archaeological work was undertaken. In Italy a new epoch began when Fiorelli in 1860 became director of the excavations at Pompeii and initiated more orderly clearing of the ruins, combined with adequate care of the buildings dug out. This careful preservation of the site has ensured the maintenance of Pompeii as one of the chief tourist attractions in Italy. Scholars had also been turning their attentions to Greek sites. The first large-scale excavations in Greece were those of the German archaeologists under Curtius (1814-96) who began work at Olympia in 1874, founding on the site the museum containing the Apollo from the pediment of the temple of Zeus, and the Hermes of Praxiteles. But the greatest achievement of the 19th century in Greek lands was the work of Heinrich Schliemann (1822-90). He set out in 1871 determined to find Priam's Troy and Agamemnon's Mycenae, and opened a new chapter in archaeology; a generation later, in 1901, Arthur Evans, following in his footsteps, revealed the Bronze Age civilization of Crete.

#### Early Stone Age Discoveries

Meanwhile the study of early man in northern and western Europe had been increasing, receiving a great impetus from the development of geology. It had long been believed that the flint arrowheads found scattered about the countryside were fairy weapons, while flint axes were often regarded as thunderbolts. During the 18th century the realization that they were human tools gradually made headway. Geologists and palaeontologists found the bones of extinct animals petrified in ancient rocks, and at last there came a time when fossilised human bones were observed in association with animal remains.

In the 'forties of the 19th century Danish archaeologists such as Worsaae were beginning to classify the tools of prehistoric man and to formulate the theory that before the historical period there had been long ages of human existence, an early one in which man knew only the use of stone implements, a second period when he learnt to make tools of bronze, and an Iron Age. This fitted into

the general evolutionary schemes being worked out by Darwin and others in the middle of the century. By 1865 it was realized that the Stone Age could be further subdivided into the immeasurably ancient period of chipped stone axes, when the woolly-haired rhinoceros and mammoth were still in existence, a period distinguished as the Palaeolithic Age, and the age of polished stone weapons, called the Neolithic Age.

#### Palaeolithic Art

Human remains of the Palaeolithic Age were found from time to time, such as the ape-like skull discovered at Neanderthal in Rhenish Prussia in 1856, and another species, Cromagnon man, found in 1868 in the Dordogne. Cromagnon man was a considerably higher type, and the ancestor of the present human species. It was he who developed the splendid cave art of the later Palaeolithic epoch found at Altamira, Santander, Spain, in 1879 by Sautuola and at Font de Gaume, Dordogne, France, in 1901 by the Abbé Breuil.

By the time that cave art had been accepted as Palaeolithic, it was becoming evident that between the Palaeolithic and the Neolithic there was an intermediate epoch, of a transitional (Mesolithic) culture, after the disappearance of the glaciers and before Neolithic man made the great forward step of becoming a farmer.

The study of these early human beings had to proceed without any aid from historical sources, and archaeologists were compelled to evolve their own discipline. It was found convenient to give each culture as it was isolated the name of a type-site where it was best exemplified. So the Acheulian phase of the Lower Palaeolithic is named from St. Acheul, discovered in 1854; the Magdalenian of the Upper Palaeolithic from La Madeleine, 1863. This practice has continued for other, later, prehistoric and protohistoric periods, the first period of the European Iron Age being named after the Austrian site of Hallstatt, found in 1846, and its successor from the Swiss lakeside settlement of La Tène, 1858. This chronological sorting out resulted in an ordered sequence that was a triumph for the joint efforts of prehistorians of many lands. It was facilitated by the growing knowledge of the beginnings of history in the Near East and in Mediterranean lands.

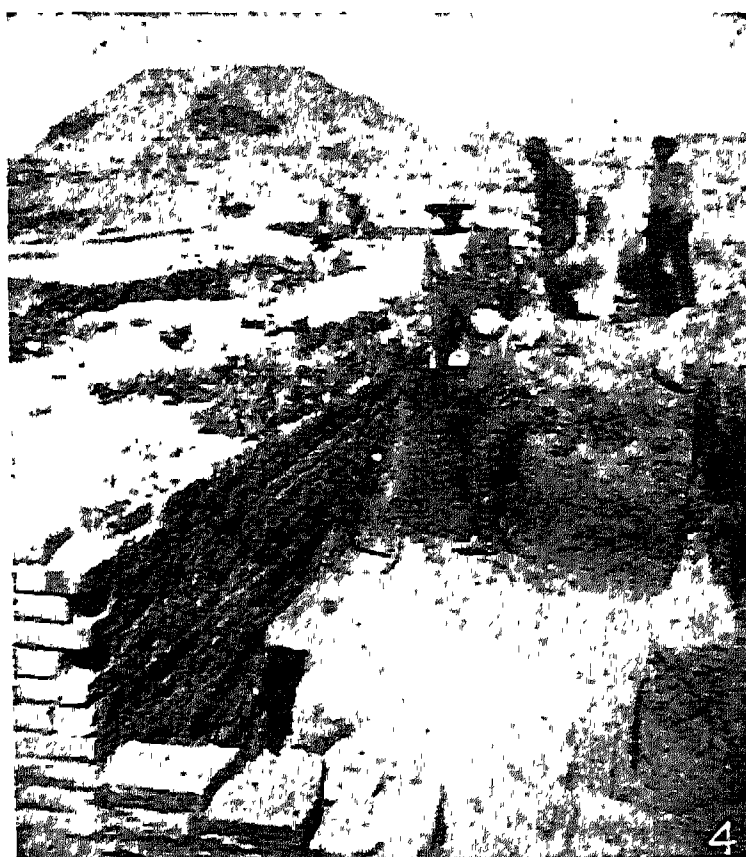
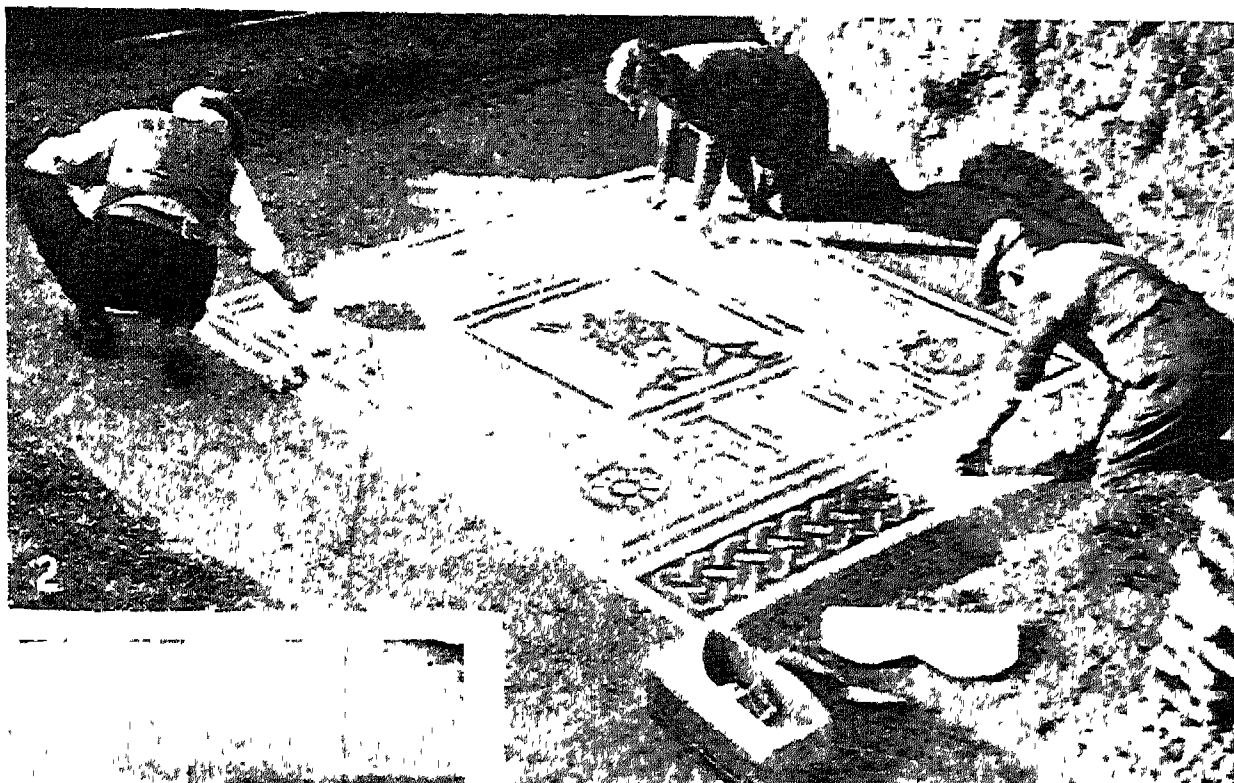
By the end of the 19th century, archaeology may be said to have been set upon its feet. In Great Britain the excavation of prehistoric sites in Cranborne Chase by General Pitt-Rivers (1827-1900) had set a high standard, while in France Colonel Stoffel, in the service of the imperial antiquary Napoleon III, had established by excavation the positions of a number of sites mentioned in Caesar's Commentaries.

The 20th century saw ever-widening fields of activity. More unknown civilizations were discovered. The work of Evans in Crete was followed in 1906-07 by excavations at Boghazkoi in central Anatolia by Winckler (1863-1913), who showed it to have been the capital of the Hittites. Many thousands of tablets were found there, some in known languages, but not until 1924 were the Hittite texts read by Hrozný (1879-1952). Explorers began to unearth the treasures of the Far East. In the 'twenties Angkor Wat was won back from the Cambodian jungle, and in India an Indus Valley civilization, exemplified in the city of Mohenjodaro which had contacts with ancient Sumeria, was unearthed. In the New World the vanished cultures of the Mayas and the predecessors of the Incas were studied with enthusiasm.

The period between the two Great Wars was one of great technical development and increasing specialisation, as the field of archaeology widened. Photography had long been invaluable as an aid in recording discoveries; now air photography, associated primarily with the name of Crawford, gave a new impetus to the making of discoveries. Spectacular finds continued to be made by the fortunate few, notably the tomb of Tutankhamen in 1923, the royal tombs of Ur of the Chaldees in 1927-28, the Anglo-Saxon ship burial at Sutton Hoo in 1939; but equally important for human history were excavations undertaken to elucidate specific problems.

#### Study of Roman Remains

The study of the Roman provinces went on apace. The resources and able scholars of the German Archaeological Institute brought method to a high degree of perfection in Germany. In Great Britain there was revived interest in the methods of Pitt-Rivers, directed by Mortimer Wheeler, Cyril Fox, and other



1. Excavated wine-shop at Pompeii; amphorae were inserted in circular holes in the ground or in masonry. 2. Roman mosaic floor uncovered at Verulamium, Herts. 3. Experts examining soil from the great earthworks at Maiden Castle, Dorset. 4. At

work on the debris covering the Temple of the Moon at Ur. 5. Site of a Roman villa at Ditchley, Oxon, the outlines of which were first revealed by differences, seen only from the air, in the corn crop covering the whole area. The outlines are emphasised here

# **ARCHAEOLOGY : HOW THE HIDDEN PAST HAS BEEN BROUGHT TO LIGHT**



excavators. Hadrian's Wall was studied with minute care by a group of distinguished archaeologists, and remarkable work was done on Avebury and other prehistoric sites in Great Britain.

Under the impetus of Fascist nationalism Italy undertook large-scale excavations, and the imperial Roman forums between the Column of Trajan and the Colosseum were opened up. New excavations at Herculaneum and Pompeii were conducted with skill. Some remarkable work was done by the American School of Archaeology on the Athenian Agora, and at Troy (Asia Minor). In the Near East, innumerable sites were excavated by Europeans, Americans, and also by Turkish and Iraqi archaeologists. The French and Italians carried out massive excavations of Roman cities in North Africa, *e.g.* Timgad and Leptis Magna.

Prehistorians were constantly attempting to improve their chronological data, and many efforts were made to devise methods of reasonably accurate calculation. A means of doing this was devised by Baron de Geer in Sweden in 1910 who studied the varves, the deposits of sediment left annually as the ice-sheet of the last glacial phase retreated. Counts made of varves by Geer and his successors showed that the Ice Age ended in Sweden about 12,000 B.C. Analysis of the pollen found in ancient peat-bogs was undertaken, to determine the flora of the various periods. In America interesting results were obtained from the study of tree rings.

After the break occasioned by the Second Great War, the study of archaeology was taken up with renewed zest. There were bombed sites in Europe to investigate before rebuilding took place. These produced some remarkable discoveries such as the frescoes with portraits of Roman empresses at Trier, or the temple of Mithras in the City of London. In Great Britain more attention was paid to the archaeology of the Dark Ages and of the medieval period.

#### Radiocarbon Dating

Technique reached new refinements. Knowledge of radioactivity and of cosmic rays was used for the radiocarbon ( $C^{14}$ ) system of dating, developed by Libby in Chicago, whereby samples of organic matter, in particular wood, from ancient sites could be examined by physicists in a special machine which recorded their radioactivity. The rate at which dead organic

matter loses its radioactivity is known, and by computing the loss of radioactivity since the death of a given object, the age of the prehistoric site from which that object has been taken can be calculated within certain limits. The radiocarbon method was of particular value in the study of prehistoric periods. Another technical development was the system of "resistivity," whereby the archaeologist could use a kind of geiger counter in his search for buried masonry. As a picturesque but sometimes productive side-show, the development of underwater swimming with the use of the aqua-lung resulted in discoveries such as that of a Greek wine-ship off the Riviera coast.

THE ART OF EXCAVATION. Efficient excavation remains the basic function of the archaeologist, and it requires a high degree of technical skill. The basis of archaeological technique is, as in geology, the study of stratification. This is the study of the layers of remains left by successive occupations of a site, whether a cave or a building, which, if left undisturbed, will be datable in relation to one another, the oldest objects being found in the bottom layer, the youngest in the top. This principle was gradually adopted, being particularly obvious in prehistoric caves, where the remains of man and his artefacts had become fossilised. It was then applied to sites with buildings and Schliemann, for instance, realised that he was dealing with the remains of successive towns piled one above the other in the mound of Troy.

#### Flinders Petrie in Egypt

In 1904 Flinders Petrie, who had been excavating for 20 years in Egypt and in Palestine, published his *Methods and Aims in Archaeology* with a description of his system of sequence dating. This demonstrated the great value of pottery as a means of dating. His classic site was Tell el-Hesi in Palestine, where he had studied the pottery types and other objects from successive occupations in a tell 60 ft. in height. Some of these levels contained Egyptian objects of known dates which enabled him to date the levels themselves and the type of pottery in them. Then he could proceed to classify the sequence of the different types of pottery from the bottom to the top of the mound, and establish a relative chronology by which other mounds yielding these types of pottery could be dated. This

system of dating was extended widely afield and notable results were achieved in the dating of the Cretan civilization through equating its stratification with the Egyptian by means of Cretan objects found on dated Egyptian sites and tombs.

#### Pitt-Rivers System of Recording

The study of stratification is, of course, not as simple as it appears at first sight. Strata of human occupation are rarely so straightforward as to appear in section like a layer cake. Pioneer work in the art of excavation was done by Pitt-Rivers in Wiltshire in the 'eighties of the 19th century. He laid down a system whereby he could "record every object in such a manner that it could be replaced accurately in its findspot on the recorded plan and section." This involved much closer supervising of an excavation than was then usual. It is vital that the objects found in one layer be kept separate from those in the next layer (this being usually done by marking them, if possible, and then tying them in bags kept carefully labelled for each layer). The Pitt-Rivers method involves the additional precautions of recording in three dimensions the position of objects within the layer by measuring their depth from a given datum line and their distance from the sides and ends of the trench or from other convenient points.

To examine the layers on a site, a series of trenches may be dug across it. A trench is dug layer by layer. The layers are distinguished by changes of colour in the soil: an occupation layer will tend to be dirty grey in colour and to contain broken potsherds and other objects. When the trench has been excavated its sides are studied carefully because they show in section the layers which have just been dug out. The sections are then carefully drawn to scale by the excavator. Where possible, especially on large sites, the area to be dug is divided up into squares which are then excavated, leaving a grid of balks of earth between them. Walls and other features are carefully preserved as they are reached, and recorded on the general plan of the site before any part of them is removed in order to penetrate to still deeper layers.

Essential members of an archaeological party, in addition to the supervisors of the actual digging, are the surveyor and the photographer. The preliminary survey of a site is

greatly facilitated if air-photographs are taken and studied in advance (*see under* Air Photography, p. 196).

**WORK OTHER THAN EXCAVATION.** The products of an excavation have to be studied with care. The study of such things as pottery or flints is of prime importance, because a knowledge of a type of pottery may make it possible to date a site or layer in the absence of written records. On a classical site, there is always the hope that inscriptions or coins will be found, and epigraphy (the study of inscriptions) and numismatics (the study of coins) are special branches in themselves. Specialists also concern themselves with the clay tablets which contain records of Mesopotamian cultures and have opened the way to the interpretation of more than one ancient script. In Egypt specialists work on the hieroglyphic inscriptions, and the cognate study of papyrology.

#### Preserving Delicate Objects

Another specialist whose work is of great importance is the expert on the preservation of delicate objects, whether they be of metal, or wood, or textiles. This is primarily museum work, but some skill and chemical knowledge should be available in the field or much valuable evidence may be unwittingly destroyed.

**ARCHAEOLOGY AS A STUDY.** The widening scope of archaeological study and its numerous branches, and its consequent impact on scholarship, are reflected in the development of archaeology as an academic subject in the universities.

The 19th century saw the institution of professorships in classical archaeology in Cambridge, Oxford, and London, and the beginning of specialised teaching in Egyptology and other Near-Eastern subjects. The scope of university studies in archaeology steadily widened after the First Great War. Cambridge led the way with an honours school of archaeology and anthropology. The facilities at Oxford, always an outstanding centre for Romano-British archaeology as well as for the archaeology of the classical lands, were greatly increased by the foundation of the Griffiths institute. This was established for the study of ancient Egypt and the Near East. In London the institute of archaeology covers a wide field, including the archaeology of prehistoric Europe, of the Roman provinces, and of the Near

East; it also gives a training in practical archaeology. Liverpool has its institute of archaeology, and most other English, Scottish, and Irish universities, notably Durham with its special facilities for Roman frontier studies, have an archaeological department.

#### British Schools of Archaeology

Another development has been the foundation of British schools of archaeology abroad. The first established were those at Athens and at Rome. The period between the two Great Wars saw the institution of the British Schools at Jerusalem and in Iraq. After the Second Great War an institute was founded at Ankara to take advantage of new opportunities then made available for archaeologists in Turkish territory. All these schools afforded openings for research and excavation.

Archaeology is a highly specialised discipline; yet it is one whose general outlines the untrained mind can appreciate. Its concern with common things keeps it in touch with the man in the street who may be impatient of the more abstract subjects or lost among scientific formulae. It is a mixture of the romantic and the humdrum, and this helps to account for the growing popular taste for the subject in the 20th century. The Press was quick to realize the popular appeal of archaeology, whether in such magnificent guise as Tutankhamen's tomb or in more homely matters such as the heating arrangements of a Romano-British bath building. Broadcasting fostered this appreciation, and the visual aid of television brought archaeology into the homes of the people. The unprecedented interest displayed by the British public in the discovery of the temple of Mithras in Bucklersbury, London, in 1954 was a natural result.

#### Bibliography.

Man and his Past, O. G. S. Crawford, 1921; Wessex from the Air, O. G. S. Crawford and A. Keiller, 1928; Digging up the Past, C. L. Woolley, 1930; Seventy Years in Archaeology, W. Flinders Petrie, 1931; Wonders of the Past, ed. Sir John Hammerston (2 vols.), 1934; The Preservation of Antiquities, H. J. Plenderleith,

1934; Archaeology and Society, Grahame Clark, 1939; The Personality of Britain, Cyril Fox, 4th ed., 1943; Time and Chance, J. Evans, 1943; Foundations in the Dust, Seton Lloyd, 1947; Pioneer to the Past, C. Breasted, 1948; A Hundred Years of Archaeology, Glyn E. Daniel, 1950; Beginning in Archaeology, K. M. Kenyon, 1952; Dating the Past, F. Zeuner, 2nd ed., 1952; Archaeology from the Earth, Mortimer Wheeler, 1954; Field Archaeology, R. J. C. Atkinson, 2nd ed., 1954; Still Digging, Mortimer Wheeler, 1955; Piecing Together the Past, V. G. Childe, 1956.

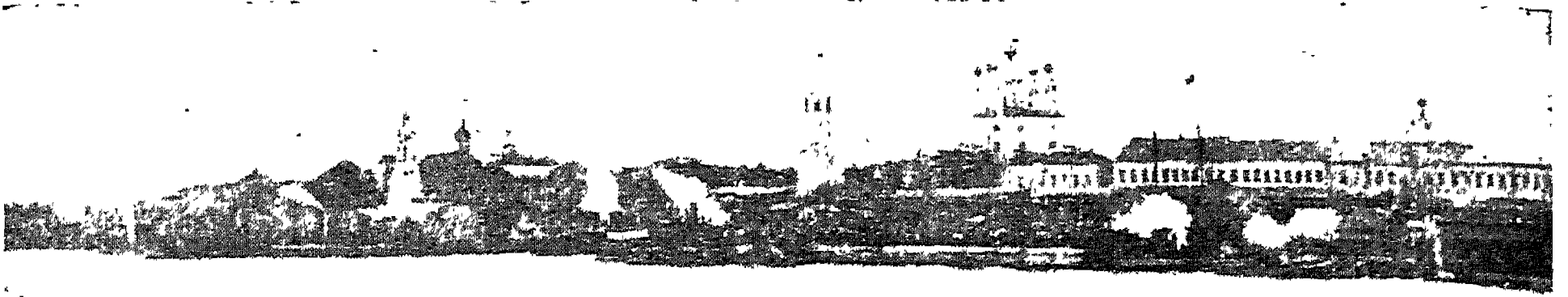
**ARCHAEOLOGICAL SOCIETIES.** The Society of Antiquaries (*q.v.*) of London, founded in 1707, is the leading British society concerned with archaeology and kindred studies. On the Continent special prestige attaches to the French Académie des Inscriptions and the German Archaeological Institute. American archaeology is represented by the Archaeological Association of America. Each country has many archaeological bodies, including local groups (such as the English county societies) and societies with special interests, *e.g.* the Prehistoric Society, the Palestine Exploration Fund, the Egypt Exploration Society. Many countries maintain archaeological academies at important centres, *e.g.* Rome, Athens, Jerusalem. State-supported archaeological institutions include the German Institute. In Great Britain, much is done through the Royal Commission on Historical Monuments; and through the British Academy. A body maintained to coordinate the work of British societies is the Council for British Archaeology, 74, Onslow Gardens, London, S.W.7.

**Archaeopteryx AND ARCHAEORNIS.** Two fossils discovered in 1861 and 1877 respectively



**Archaeopteryx.** Fossilised impression of skeleton and feathers, now in the British Museum (Natural History)





Archangel. Russian seaport on the North Dvina at the head of the Gulf of Archangel. It is ice-free from June to September. Dome-topped towers and spires are characteristic of its architecture

in the Upper Jurassic lithographic stone of Bavaria, which was laid down something like 150 million years ago. The skeletons suggest flying (or at least gliding) reptiles about the size of crows, with long tails, clawed fingers on the wings, free vertebrae, and teeth. The presence of feathers, however, has led to their classification as primitive birds, of which they form the separate sub-class Archaeornithes. The more nearly perfect specimen is *Archaeornis* in the Berlin Museum; *Archaeopteryx* in the Natural History Museum, London, lacks the head. A single feather found in 1861 was labelled *Archaeopteryx lithographica*.

**Archangel** (Gr. *archi-*, chief; *angelos*, angel). The title of the highest order of angel. The Jews named seven: Michael, Gabriel, Raphael, Uriel, Chamuel, Jophiel, and Zadkiel, the last three being unrecognized in the Christian

Church. The first two are mentioned in the A.V.: Michael, *i.e.* who is like God, Dan. 10, Jude, and Rev. 12; Gabriel, *i.e.* Man of God, Dan. 8 and 9, and Luke 1. Raphael, *i.e.* God has healed, is referred to in Tobit; and Uriel, *i.e.* light of God, in 2 Esdras 4, 5, 10. Chamuel means he who sees God; Jophiel, the beauty of God; and Zadkiel, the righteousness of God.

**Archangel.** Popular name for the yellow-flowered *Galeobdolon luteum*, a British woodland herb of the family Labiatae. The name is occasionally applied to species of *Lamium* (dead-nettles), in which genus *G. tuteum* is sometimes included. The names archangel and archangelica are also sometimes given to the umbelliferous plants more often called Angelica.

**Archangel** OR ARKH-ANGELSK. Seaport and city of the R.S.F.S.R., capital of a region of the same name. It lies for 10 m. along a narrow, marsh-bound strip of country on the main branch of the N. Dvina delta, 25 m. from the White Sea, and less than 130 m. S. of the Arctic Circle. Although the harbour is blocked by ice from late Oct. to late spring, Archangel is the chief lumber port of the U.S.S.R., handling about one-third of the entire national lumber exports. It is also the chief saw-milling centre of the U.S.S.R., has ship-building and repair yards and fish processing factories, and makes rope.

The town was founded in 1584 following the establishment of Anglo-Muscovite trade that resulted from the visits of Richard Chancellor (*q.v.*). It flourished during the 16th and 17th centuries, when it was the only Russian port, declined after the building and rapid expansion of St. Petersburg, but revived with

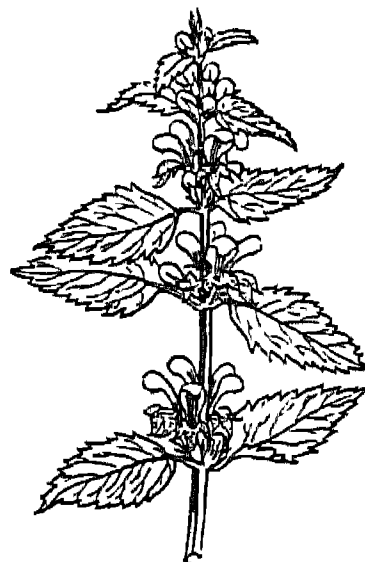
the construction of the rly. from Moscow, nearly 700 m. S.S.E., in 1897. Pop. (est.) 300,000.

During the First Great War Archangel was a supply base for the Russian army and the scene of two explosions causing casualties among British subjects. In 1918 it was occupied by an Allied force opposing the Bolsheviks. During the Second Great War it became one of the chief ports for the reception of Anglo-American war materials brought to Russia by British convoys, 1942-43.

Archangel region lies on the White and Berents Seas, and includes the Nenets area, national home of the Samoyeds (Nentsy), as well as Franz Josef-land, Novaia Zemlia, and other Arctic islands. The mainland is drained by the Onega, North Dvina, Mezen, and Pechora rivers. Much of it is tundra, but the river valleys are fertile with dairy-farming and some

grain-growing. Lumbering is the chief industry. The main rly. line from Moscow to Archangel, running almost due N.-S., and two branch lines serve the region. One, constructed 1939-40, runs from Obozerskaya, 35 m. S. of Archangel, W. and N.W. to Belomorsk at the N. end of the White Sea-Baltic canal; the other, constructed 1940-42, leaves the main line at Konosha, 200 m. S. of Archangel, and runs E. and N.E. to Ukhta, Pechora, and Vorkuta. Area 230,000 sq. m. Pop. (est.) 1,050,000.

**ARCHANGEL EXPEDITION** OF 1918. In the spring of 1918 the Allies of the First Great War decided to occupy Archangel and Murmansk, together with the Murmansk rly. Their object was to safeguard against attack by the Red Army the huge accumulation of military stores at Archangel, and to facilitate if possible



Archangel, the British dead-nettle



Archangel. Gabriel, archangel of the Annunciation: from a painting by Melozzo da Forlì

the reconstitution of an eastern front against Germany by eventual contact with Czecho-Slovak forces and Admiral Koltchak's White Army W. of the Urals.

Murmansk was accordingly occupied by British, French, and U.S. troops in June-July. Allied warships, overcoming Red Army opposition, anchored in Archangel harbour on Aug. 2, and British troops entered the city next morning. Further British detachments were landed at Onega Bay, S.W. of the White Sea. After spasmodic fighting, the Allies, under General Ironside, had occupied by the winter a curve of territory which was deepest at Archangel. They were driven from Shenkursk on Jan. 24, 1919, and were forced to make other minor withdrawals during the ensuing months. A general Red Army offensive in May was completely repulsed, and a first contingent of reinforcements, consisting of British volunteers, reached Archangel. But the British government had meanwhile decided, early in March, to evacuate both Murmansk and Archangel. Allied policy became limited to the equipping of local anti-Bolshevik Russian forces (about 23,000 men) and subsequent withdrawal under cover of an offensive. Lord Rawlinson was appointed supreme commander, to coordinate the withdrawals, which began in June. In July the Red Army was defeated on the Dvina and at Yemtsa. Evacuation proceeded through Sept., and on Sept. 27 the British naval base at Archangel was closed. Evacuation of the Murmansk area was completed by Oct. 12, 1919. Consult Archangel 1918-19, F. M. Lord Ironside, 1953.

**Archangel**, GULF OF. Bay of N. Russia. An inlet of the White Sea, it extends inland about 65 m. and receives the waters of the N. Dvina.

**Archbishop** (Gr. *archi-*, chief; *episkopos*, overseer). Principal bishop of a province, who while governing his own diocese presides over the bishops of a group of dioceses. Athanasius (d. 373) so described himself and his predecessor in the diocese of Alexandria, but the term was not strictly used in its present sense before the 6th century, and the date of its origin cannot be fixed. Metropolitan is an equivalent title in the Roman Catholic Church.

The design of Pope Gregory I to divide Britain into two sees, London and York, was abandoned because Kent was the first part of

the kingdom to receive Christianity. Augustine was the first archbishop of Canterbury, but the claim of the holder of the see to be primate of all England was not definitely settled until 1353. Lichfield in the 8th century and St. Davids in the 12th had archbishops. Paulinus, as bishop of Rochester, held the pall or pallium of an archbishop, 633-644. The first archbishop of York was Egbert (732). Irish bishops received consecration from Canterbury until 1152, though Ferns was once archiepiscopal. In 1472 Pope Sixtus IV created the bishop of St. Andrews archbishop and metropolitan of all Scotland.

In the Church of England the archbishop of Canterbury is primate of all England and metropolitan. He ranks as a prince immediately after the princes of the blood royal and before all other subjects. He has the right of crowning the sovereign. His brother of York, as primate of England, has precedence of all dukes save those of the blood royal and all officers of state save the lord chancellor, and the right of crowning a queen consort. In speaking and writing they are given the title of Grace and Most Reverend Father in God, and write themselves "by divine providence," with, as signature, their Christian name followed respectively by Cantuar and Ebor, abbreviations of the Latin forms of Canterbury and York. The archbishop of Canterbury has under him all bishoprics in England, except those of Durham, Ripon, Chester, Newcastle, Wakefield, Liverpool, Manchester, Carlisle, Sodor and Man, Sheffield, Blackburn, Southwell, and Bradford, which are in the province of York. The Protestant archbishop of Armagh is primate of all Ireland; the archbishop of Dublin is primate of Ireland. On the disestablishment of the church in Wales, which came into effect April 1, 1920, Wales was constituted a separate province under its own archbishop, who is chosen out of the six bishops.



Archbishop. The Primate of All England, in his robes

The episcopal church of Scotland has no archbishop. In the British Commonwealth there were in 1956 Anglican archbishops in Canada (provinces of Canada, Ruperts Land, Ontario, and British Columbia, and in addition a primate of All Canada); Australia (New South Wales, Victoria, Queensland, Western Australia, and a primate of Australia); and in the provinces of New Zealand, South Africa, West Indies, West Africa, and Central Africa.

In England and Wales there are six R.C. archbishops: Westminster, Cardiff, Birmingham, Liverpool, Middlesbrough, and Portsmouth; in Scotland, two: St. Andrews and Edinburgh, and Glasgow; British America has 16; British Africa has 12; Australasia has seven. In the U.S.A. there are 21 R.C. archbishops, but no Protestant holder of the title.

**Archchancellor** (Latin *archicancellarius*). A dignitary of the Holy Roman Empire. The archbishops of Mainz, Cologne, and Trier (Trèves) were respectively archchancellors for Germany, Italy, and the kingdom of Burgundy or Arles. They were merely chancellors who received a higher title on account of the greater importance of their office. The archchancellorships of Italy and Arles gradually declined in importance, but that of Germany lasted until the dissolution of the Empire in 1806. See Chancellor.

**Archdeacon** (Gr. *archi-*, chief; *diakonos*, minister). Official of the early Christian Church and existing today in the Roman Catholic but more especially in the Anglican Church. As the name suggests, he was chief of the deacons serving a cathedral. First appearing in the 3rd century, archdeacons were soon the chief assistants of the bishops, their special duties being to look after clerical morality, church buildings, etc., and in general to relieve the bishops of much detail work. In the 11th century districts were allotted to them, and their authority, thus encouraged, grew at the expense of that of the bishops, until they became practically independent, with full control over the secular or administrative side of the Church's work. It was then that they earned an unenviable notoriety for rapacity and harshness towards the lower clergy, evidenced in the question of the medieval schoolmen: Can an archdeacon be saved? In the Roman Catholic Church archdeacons are little more than titular dignitaries,



their only duty being to present candidates for ordination.

In the Anglican Church, on the other hand, the archdeacon is still a prominent official, for, having come in with the Normans, he survived the vicissitudes of the Reformation. Before 1836 there was one for each diocese, but afterwards the number was increased to two or four, each having his own archdeaconry. Their duties include the visitation of the parishes, the supervision of church buildings, the hearing of cases in their courts, and the admission of churchwardens. They are members of Convocation and almost invariably hold a canonry or other living in the diocese. In order to be appointed an archdeacon, one must have been for six years a priest. Archdeacons are appointed by the bishops. See Church of England; Ecclesiastical Law.

**Archduke** (Gr. *archi-*, chief. Lat. *dux*, leader). Title long borne by princes of the family of Hapsburg, rulers of Austria. It was assumed about 1358 by one of the dukes of Austria and from that time that country's rulers were always known as the archdukes. Later came the practice of calling all the princes of the Hapsburg family archduke and so we have the archduke Charles, the archduke Francis Ferdinand, and others who were not rulers. The title has never been borne by any other family. The archduke Otto (b. 1912), eldest son of the last emperor, Francis Charles, became the claimant to the Austrian throne on the death of his father, 1922.

**Archegonium.** In botany, a female organ containing the egg or ovum in a swollen basal portion, the venter, and with a longer or shorter neck, down which the male gamete must pass in order to fertilise the egg. Archegonia are found in the bryophyta and pteridophyta, and, in a very much reduced state, in the gymnosperms.

**Archelaus.** Pretender to the Egyptian throne. A son of the Cappadocian Archelaus, one of Mithradates' generals, in 56 B.C. he wedded Berenice, daughter of Ptolemy Auletes, who had been raised to the throne in place of her father, but after six months both were slain, during an invasion instigated by Ptolemy.

**Archelaus.** King of Judaea, son of Herod the Great. The Roman emperor Augustus reduced his status in 4 B.C. to that of ethnarch, or governor, of Judaea,

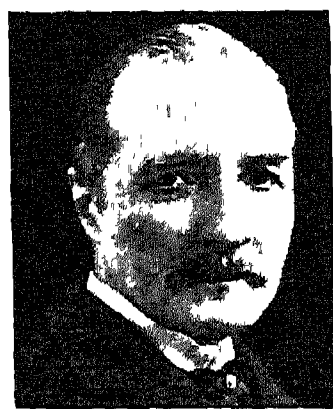
Samaria, and Idumaea. For his cruelty and marriage with his brother's widow he was deposed c. A.D. 7 and banished to Gaul.

**Archelaus.** King of Macedonia, 413-399 B.C. He introduced Greek culture into his country, constructed roads and built towns, and reformed the army. The dramatist Euripides and the painter Zeuxis were resident at his court.

**Archer, FREDERICK JAMES** (1857-86). British jockey. He was born at Cheltenham, Jan. 11, 1857, and as a boy of 13 rode Athol Daisy to victory in a nursery race at Chesterfield in 1870. Altogether he rode in 8,084 races and won 2,748, heading the list of winning jockeys from 1873 to 1885.

He was successful in five Derbys, six St. Leger's, and was on the back of four Two Thousand and Oaks winners. He shot himself when lying ill of typhoid fever at Falmouth House, Newmarket, Nov. 8, 1886, and was buried at Newmarket.

**Archer, WILLIAM** (1856-1924). British dramatic critic and author. Born at Perth, Sept. 23, 1856, he



William Archer

was educated at Edinburgh. He came to London in 1878 after travelling in Australia in 1876-7. He was dramatic critic to many journals including The London Figaro, The World, The Tribune, The Nation, and The Star. It is, however, as a disciple of Ibsen that he was best known. He edited Ibsen's prose dramas in five volumes and the complete works in 11 volumes, besides collaborating in a translation of Peer Gynt. He was also the author of a Life of W. C. Macready, 1890; Poets of the Younger Generation, 1902; Through Afro-America, 1910; The Old Drama and the New, 1923 and other books; also a drama, The Green Goddess, and other plays. He died Dec. 27, 1924. Consult William Archer, his Life, Work and Friendships, C. Archer, 1931.

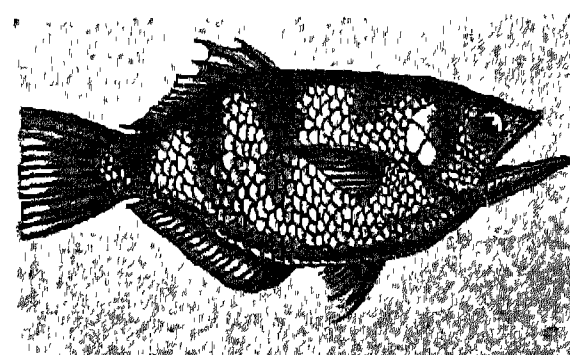
**Archer Fish.** Name of a small East Indian fish. It is so called from its power of squirting drops of water from its mouth at its prey.

which consists of small insects. One species, *Toxotes jaculator*, has been known to squirt a drop of water as far as 5 ft.

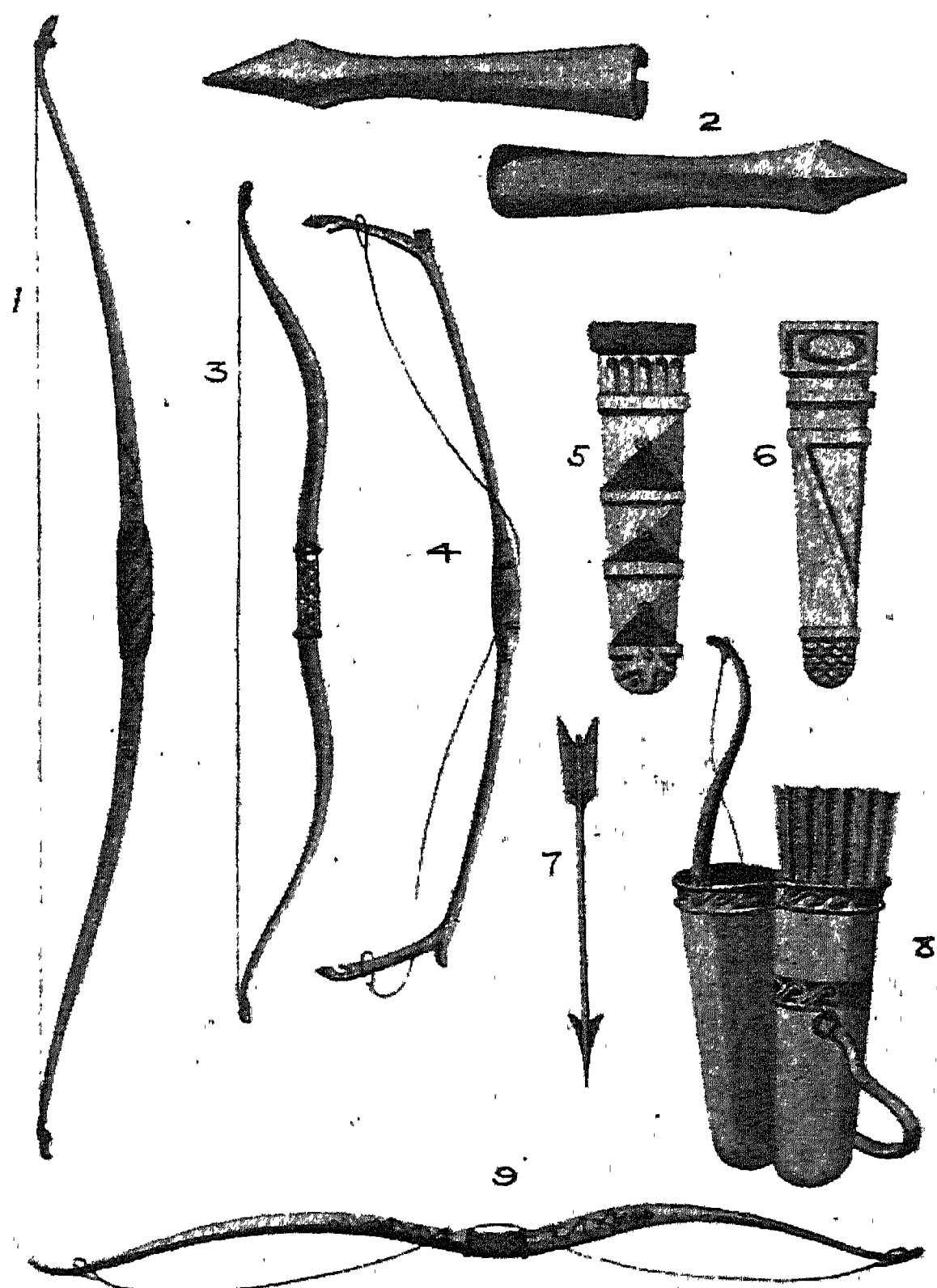
**Archery.** Art and practice of shooting with a bow and arrow. Employed from the earliest times in warfare and hunting throughout the world until invention of gunpowder, it is now indulged in only as a pastime. It was revived as such in 1780 by Sir Ashton Lever and some friends at Leicester, and in 1781 the Royal Toxophilite Society was founded ever since regarded as the controlling authority. The Royal Company of Scottish Archers, which constitutes the sovereign's bodyguard for Scotland, dates from c. 1650. The Honourable Artillery Company of London originated with a body of archers established by Henry VIII.

The implements used for the sport in its modern form comprise the bow, arrows, tips for covering the fingers, the bracer or arm-guard, and the target. Bows, if made of one piece of wood, are termed "self"; but if composed of two or more strips of wood glued are described as "backed." The former are invariably made of yew, the latter of various combinations. The length of a woman's bow should be about 5 ft. 6 ins., that of a man's 6 ft. The strength of a bow is reckoned by the number of pounds it takes to pull it a distance (from string to bow when fully bent) of 25 ins. in the case of a woman and 28 ins. in that of a man. The former bow would be marked 25 lb., the latter 48 lb.

Arrows are made of deal, of four different shapes; either they are of the same thickness from end to end, or are barrellled or tapered in different parts. The feathers with which they are winged are either of the straight pattern or parabolic variety. Tips are leather protections for the fingers of the right hand: they should fit accurately. The bracer is the leather guard strapped on the left arm to protect it from the recoil of the string after the arrow is released. The target is circular, 4 ft. in diameter, stuffed with straw, having a canvas face on which are painted



Archer Fish, which shoots its insect prey with squirted drops of water



Archery. 1. Early English bow, period Edward IV. 2. Two English arrowheads. 3. Grecian bow. 4. Bow of whalebone and wood, N.W. American. 5. Egyptian quiver. 6. Greco-Egyptian quiver. 7. Egyptian arrow. 8. Theban bow-case and quiver. 9. Etruscan bow

five rings: the centre or bull's-eye being gold (technically called the gold), then red, blue, black, and white, and counting respectively 9, 7, 5, 3, and 1. The distances shot over vary from fifty to one hundred yards.

**Bibliography.** Toxophilus, Roger Ascham, 1545, repr. by Edward Arber, 1868; another ed. by W. A. Wright, 1904; Archery, C. J. Longman and H. Walrond, 1894; Modern Methods in Archery. N. Reichart and G. Keasey, 1936. The New Archery, P. H. Gordon, 1939.

**Arches, COURT OF.** An English court of law, so named from being held in the church of S. Mary-le-Bow (*Maria de Arcubus*). It is the appellate court of the archbishop of Canterbury as metropolitan of the see of Canterbury. The presiding officer is commonly called dean of the arches, though his real title is official principal. He must be a judge, or ex-judge, or a barrister at least 10 years in practice. Most important ecclesiastical cases are decided in this court, from which there is an

appeal to the Privy Council.

**Archetype.** A concept of Jung's, difficult to describe simply. It covers an inherited idea or mode of thought, usually personified and present in the unconscious mind, influencing an individual's behaviour and opinions. The number of such ideas is small, because an archetype is limited by the fundamental experiences that man has had in the course of time. He thinks, for example, that a man's attitude to woman is dependent not only on his real experience of her, but also on the collective inherited image of woman which exists in a man's subconscious. Together with a latent feminine principle in man, this constitutes the Anima. The Animus is the masculine counterpart in women.

**Archidamus.** Name of five kings of Sparta. The first reigned c. 630 B.C. The second (reigned 476-427 B.C.) crushed the helots, and in 431 led armies into Attica, where he ravaged Athenian terri-

tories. He was the father of Agesilaus (*q.v.*), whose son, the third Archidamus, became king in 361. Ten years earlier this latter had laid waste Arcadia, and in 362 had successfully resisted Epaminondas. He died in Italy in 338. His grandson, fourth of the name, was captured by Demetrius Poliorcetes in a battle near Mantinea about 296. Archidamus V, last of his line, acceded on his brother's murder in 240 B.C. He fled to Messenia, but was recalled and soon put to death by the same assassins.

**Archidona.** Town of Ecuador, in Napo Pastaza prov. It stands near the Napo, 121 m. E.S.E. of Quito. Established about 1556, it became a centre of the Jesuit fathers, who were expelled in 1767 but returned a century later. It trades in rubber, timber, feathers, and vegetable ivory.

**Archil** OR **ORCHIL.** Purple dye prepared from various lichens of the genus *Rocella*. It appears in commerce as archil, a pasty mass; persis, a drier paste; and cudbear, a red-brown powder. The art of dyeing with archil was discovered by a citizen of Florence, who adopted the name Rucellarii or Oricellarii. The lichens from which the dye is prepared grow on the coasts of warm and tropical regions, e.g. the Mediterranean, Canary Islands, Zanzibar, Ceylon, and Java.

The dye is prepared by treating the finely chopped lichens with dilute ammonia and keeping at the temperature of the air until a dark violet paste forms. The mass is then thinned with more ammonia and pressed, the liquid obtained being blue archil. Red archil is obtained by heating this solution, when the ammonia is driven off. When carbonate of soda is used, litmus results. After the discovery of aniline dyes archil lost its importance.

**Archilochus** (c. 700 B.C.). Greek lyric poet. He was an Ionian of Paros by birth, and went to Thasos in early life. There he wrote the verses satirising the family of Neobule, whose father Lycambes had forbidden her marriage with Archilochus after giving his consent.

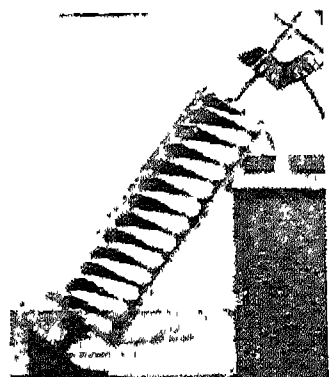
According to the story, Lycambes was so overwhelmed with shame that he hanged himself. The latter part of the life of Archilochus was spent at his native Paros, and he died fighting in a war with the people of Naxos. Only fragments of his poetry survive, but he was regarded as one of the great poets of Greece,



and, incidentally, the first to perfect iambic verse, especially as a vehicle of sarcasm.

**Archimandrite** (Greek *archi*-, chief; *mandra*, fold). Title in the Eastern Church for the superior of a monastery, or for an abbot who presides over more than one monastery. It dates from the 4th century. See Greek Church.

**Archimedean Screw.** Device used to raise water to a higher level. Its invention is attributed



Archimedean screw, for raising water

to Archimedes (*q.v.*). In form it consists of a cylinder in which a spiral screw revolves, and it is an essential principle that the lowest point of

one thread must not be higher than the highest point of the thread immediately below. The cylinder was placed with its lower end in water, and with its body inclined at an angle that met the condition mentioned. Then by rotating the spiral screw by a handle usually placed at the upper end, water was raised through the long spiral chamber formed by the screw in contact with the internal wall of the cylinder. When the water reached the top of the cylinder it flowed out at the higher level.

**Archimedes** (c. 287–212 B.C.). Greek mathematician. Born at Syracuse, Sicily, he wrote on nearly all the mathematical subjects known in his period, and his theory of the lever supported the science of statics for some 1,700 years, until the time of Stevinus (A.D. 1586). His theory of hydrostatics was nearly as long-lived, for little advance was made in it until Stevinus investigated the pressure of liquids. His geometrical discoveries of the quadrature of a parabolic area, and of a spherical surface, as well as of the volume of a sphere, were notable achievements. The Romans, at whose hands he fell during the capture of Syracuse, erected a tomb to him on which was engraved the figure of a sphere in its circumscribing cylinder.

Among his numerous extant writings, consisting of detached essays, are three on plane geometry—on the circle, the parabola, and spirals; two on three-dimensional geometry—on the sphere and cylinder; two papers on arithmetic; and two works on mechanics and hydrostatics. His hydrostatics recalls the famous story that once he ran naked from

the bath through the streets of Syracuse shouting Eureka! (I have found it!). The discovery, prompted by the upward pressure of the water on his body in the bath, was that equal weights of different metals, such as gold and silver, when weighed in water will no longer appear equal. Each seems lighter than before by the weight of water displaced, but the bulkier metal, silver, will suffer in water a greater diminution in weight.

The discovery, according to the story, was utilised to detect the introduction by a fraudulent goldsmith of some silver into a golden crown made for King Hiero.

The Archimedean screw for raising water, and the apocryphal burning glasses which set fire to ships by focussing the rays of the sun on their sails, are attributed to him. His works have been edited in modern notation by T. L. Heath, 1897.

**Archipelago** (Gr. *archi*-, chief; *pelagos*, sea). Name originally given to the island-studded Aegean Sea. It is now applied generally to groups of islands, e.g. the East Indian Archipelago.

The islands familiarly known as the British Isles are strictly an archipelago, which rises above the shallow continental shelf of Western Europe. This fact is an illustration of the circumstance which gives a geographic unity to an archipelago: the islands are all joined by submarine shelves, banks or ridges; the West Indian



Archimedes, Greek mathematician



Architect. Façade of the Royal Institute of British Architects, Portland Place, London, W.  
Courtesy of R.I.B.A.

Archipelago, for instance, comprises the remnants of the ancient Antillean continent, most of which has been submerged. Archipelagos have been of considerable importance in the history of civilization; it would be difficult to estimate the value of the Aegean Archipelago in the development of the might of ancient Greece; one of the chief factors in the growth of Britain has been the fact that it is an archipelago.

**Architect** (Greek *archi*-, chief; *tekton*, builder or craftsman). A person who designs buildings and supervises their construction. The precise function and status of the architect have varied much through the ages. In ancient Egypt he was often an official of the religious hierarchy, and in that capacity designed the great temples. Many Greek architects are known by name, e.g. Ictinus and Callicrates who designed the Parthenon at Athens, and Deinocrates who designed the Pharos at Alexandria. Vitruvius (1st century B.C.), who worked in Rome as an architect, wrote a book *De Architectura* (concerning architecture), in which he described at length the training and duties of an architect in his day, outlining a very extensive range of study.

The position of the architect in the Middle Ages has been widely misrepresented and misunderstood; but it is obvious that all the more elaborate Gothic cathedrals and churches must have been designed by skilled persons. Such persons, however, hardly ever bore the title of architect. The usual term was master (*magister* in Latin, *capomaestro* in Italian), though other titles were also used. The architect was generally trained in the masons' "lodge," masonry being the principal craft in any medieval building of importance.

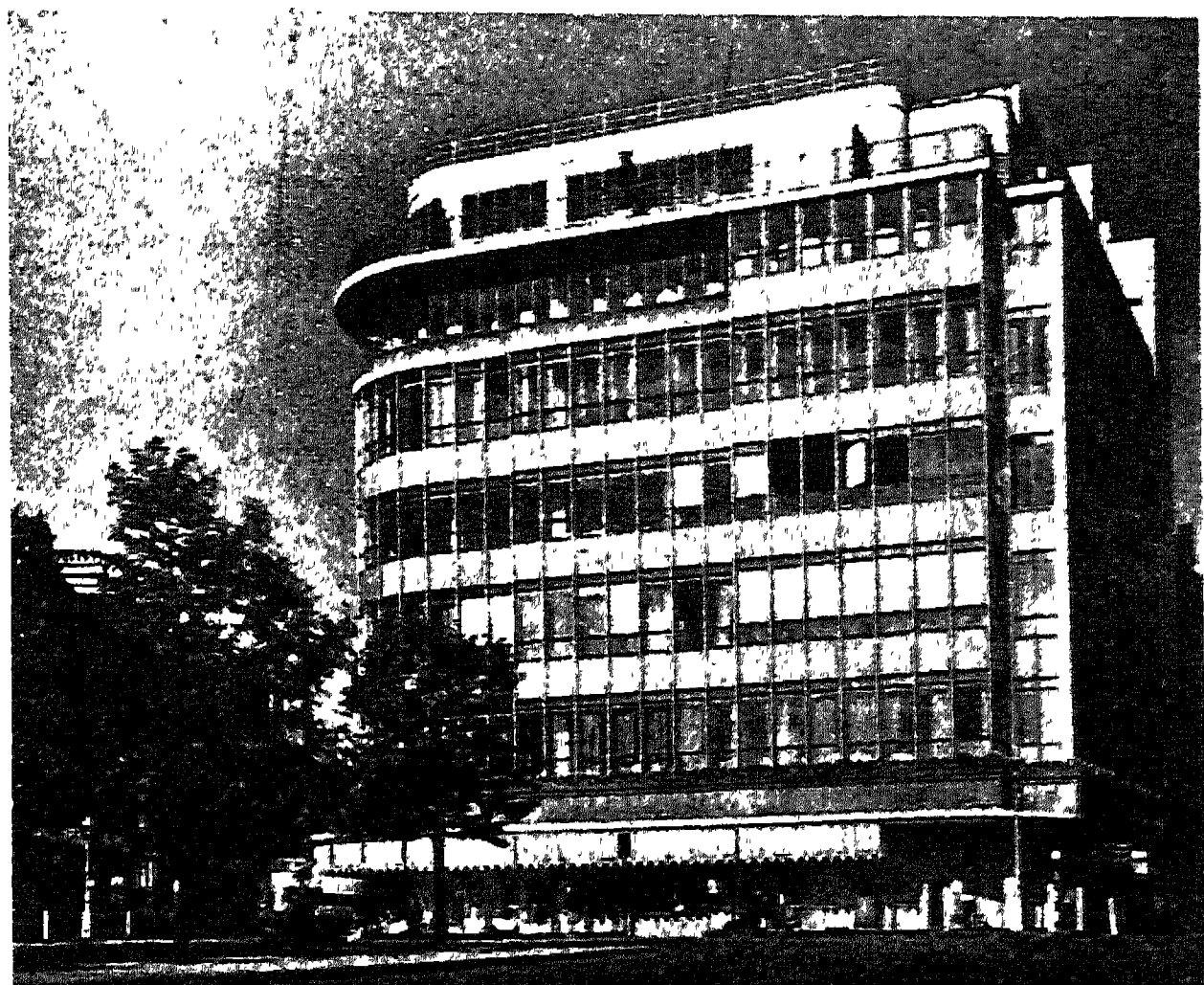
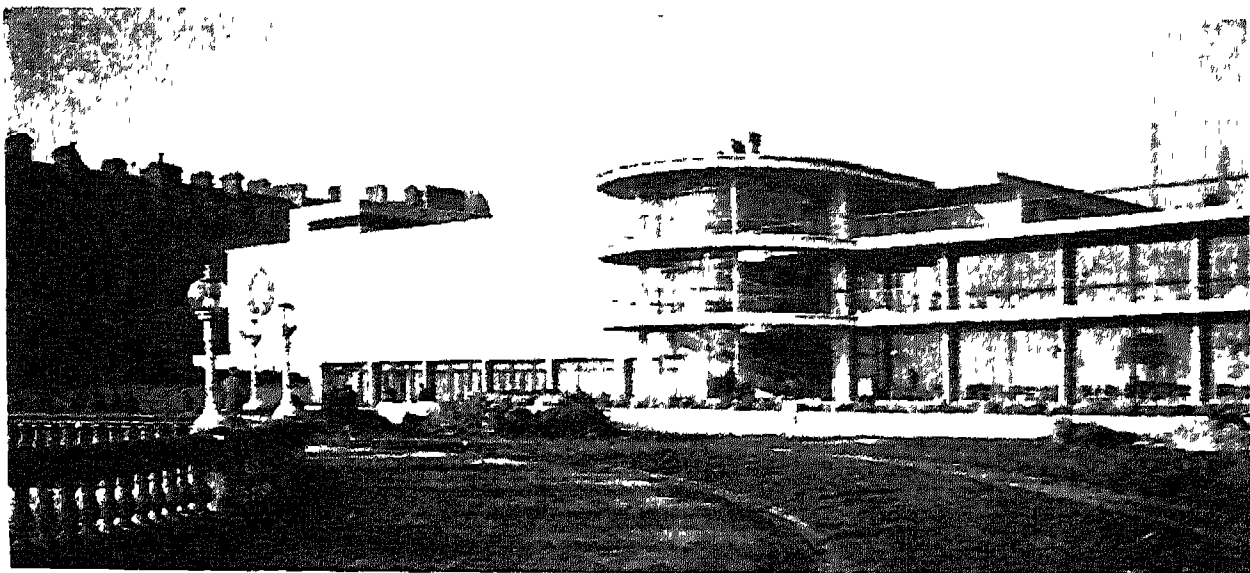
In spite of popular belief, he was hardly ever a cleric, and was seldom if ever trained in a monastic school. Such errors have arisen because clerical scribes were naturally concerned to glorify the part played in any building enterprise by the abbot or bishop who had commissioned it, rather than to preserve the name and enhance the reputation of a hired layman. Nevertheless, the names of hundreds of English Gothic architects have been recorded, effigies of several of them have survived, and a few medieval plans can still be seen, though most have perished owing to the impermanence of the material on which they were drawn, and to the fact that they were

regarded as utilitarian documents rather than as works of art.

Medieval architects, though not necessarily building contractors, were chiefly responsible for organizing and correlating the work of the various separate building crafts in the absence of a general contractor or "master builder." Italian architects of the Renaissance from c. 1420 onwards are clearly recognizable persons; but, in England, Inigo Jones (1573-1652) was almost the first architect whose status corresponds roughly to the ideas of the 19th and 20th centuries. The master builder, who was in charge of all the crafts, emerged at the end of the 18th century. Inigo Jones was trained as a scene-painter, Wren as an academic scientist; several leading architects of the following century began as building craftsmen; but in the 20th century a lengthy period of education became essential for a professional architect.

In Great Britain the profession was closed after the passing of the Architects' Registration Act, 1931, by which the right to practise is restricted to persons who have been registered by the architects' registration council. The leading professional body is the Royal Institute of British Architects. Consult *The Architect in History*, M. S. Briggs, 1927.

**Architects, ROYAL INSTITUTE OF BRITISH.** Chief architectural society of Great Britain and N. Ireland. It was founded in 1834 as the Institute of British Architects and granted a royal charter by William IV in 1837. In 1846 Queen Victoria instituted the royal gold medal for architecture, and in 1866 commanded that the prefix royal should be incorporated in the title of the institute. In 1882 compulsory examination was established for entry to the associate class of membership. The constitution provides for a president and a council on which the three classes of membership, fellows, associates, and licentiates, are represented. In 1955 there were 16,000 members and 5,000 students. The institute is a federation of architectural bodies covering the whole of the British Commonwealth and has 98 allied societies, chapters, and branches. Its library, the largest architectural library in Europe, contains many valuable books and drawings. Its offices, designed by G. G. Wornum (b. 1888) and built in 1934, are at 66, Portland Place, London, W.1.



Architecture. Three British buildings constructed during 1929-38: Top, De la Warr Pavilion, Bexhill, 1936. Centre, Peter Jones's department store, Sloane Square, London, S.W.1, 1934-38. Bottom, London Transport offices and St. James's Park Station, 55, Broadway, London, S.W.1, 1929. See article in pp. 546 *et seq.*



# ARCHITECTURE: A PRACTICAL FINE ART

MARTIN SHAW BRIGGS, F.R.I.B.A.

*This article traces the whole development of the art and science of building from pre-history to the 20th century. It is supplemented by subsidiary articles, e.g. Gothic, Mahomedan, Renaissance, Baroque, etc.; Arch, Cathedral, House, Order; Wren, and other great architects; Town Planning, etc.*

Architecture has been defined as "the art or science of constructing buildings for human use; occasionally regarded merely as a fine art"; but that definition is not altogether satisfactory. Sir Henry Wotton, in his little book on architecture published in 1624, wrote that "well building hath three conditions: commodity, firmness, and delight." Construction and planning may both be efficient, but something else is needed to make any building into a work of architecture. To ensure that, his third condition, the appeal to the eye, must also be fulfilled. Conversely, architecture, as an art, unlike painting and sculpture which appeal only to the eye, must satisfy practical utilitarian requirements; and it is certainly not true, as the famous architect Sir Gilbert Scott rashly asserted in the mid-19th century, that "architecture, as distinguished from mere building, is the decoration of construction."

## Applied Decoration Unnecessary

Many very plain and simple buildings, old or new, may justly be regarded as good architecture although they lack any carved or painted ornament; and the conditions of austerity that existed after the Second Great War did not prevent the erection of much fine architecture which had to rely on good proportion, imaginative grouping, and a tasteful choice of colours rather than on applied decoration.

The distinction between architecture and building on the one hand, and certain works of civil engineering (such as bridges) on the other, is not very clear. A "building" need not be a roofed structure, otherwise certain works of architecture, such as the Marble Arch in London and the Arc de Triomphe in Paris, would be excluded; and railway stations may be regarded as a combination of architecture and engineering. Many of the most beautiful bridges have been designed by architects; but in this Encyclopedia they are treated under the heading Bridge.

Some buildings are so rudimentary that they can hardly be called "architecture," no skill being required in their design or construction. Examples are the wigwams, shacks, and huts used by

primitive peoples; also, in comparatively recent times, the monotonous rows of cottages erected in many British towns after the Industrial Revolution. For other reasons, great stone circles like Stonehenge and earthworks like Maiden Castle must be excluded; while many authorities hesitate to classify the pyramids of Egypt as works of architecture, though here there is room for argument.

## Roman Conquest of Britain

In Britain, as elsewhere in western Europe, the story of architecture does not really begin until the Roman conquest (1st century A.D.); but in some Mediterranean countries it starts more than 3,000 years ago, and in certain lands of the East 5,000 or even 6,000 years ago. The oldest buildings which properly merit the name of architecture are found in the Nile valley of Egypt, in the Euphrates and Tigris valleys of Mesopotamia (modern Iraq), and in the Indus valley of India—the three great "riverine civilizations."

**ANCIENT EGYPT.** Because the ancient Egyptians firmly believed in a future life (see Egypt, Ancient) and regarded their earthly life as relatively unimportant, most of their surviving buildings are temples and pyramids and tombs of other types, a pyramid being a specially magnificent type of tomb, usually for a royal personage. Egyptian chronology is reckoned by the dynasties of its kings, the first dynasty beginning about 3200 B.C., or even earlier according to some scholars, and the last (the XXXth) ending in 332 B.C., when Alexander the Great conquered the country and founded the city of Alexandria. After his death came a succession of 16 kings, all bearing the name of Ptolemy; and in 30 B.C. Egypt became a province of the Roman Empire. All through those 3,000 years the characteristics of Egyptian architecture remained fairly constant in its more monumental buildings. The principle of the arch was understood, but arches were hardly ever used; and then only in primitive form.

The temples were massively constructed of heavy blocks of stone, often of granite, which were worked and transported with

amazing skill. Enormous cylindrical columns or square piers carried huge stone lintels and beams. Even the flat roofs were formed of immense stone slabs resting on the stone beams. This method of building is called trabeated construction (Lat. *trabs*, a beam); and it was followed in later years by the Greeks. Some of the larger temples had aisles, and their interiors were lit by a clerestory with windows in the wall above the range of columns or piers separating the aisle from the main body of the temple. But windows were seldom used in Egypt, the glare of the sun being so intense that dark interiors were welcome for reasons of comfort, apart from any atmosphere of mystery that they may have created in the temples.

## Dwelling Houses of Ancient Egypt

Of ancient Egyptian dwelling-houses, few if any remain. The homes of most of the people were mere mud huts, and even the better-class dwellings were of mud-brick, plastered over. A model of a typical upper-class house from Tell el-Amarna (illustrated under Egypt, Ancient, in p. 2961) has an open courtyard round which were grouped a few rooms. At Kahun, a "model village" was discovered, with some 300 small houses for workmen engaged on erecting a neighbouring pyramid c. 2500 B.C. There were also larger houses for foremen and the chief officials. The village was planned in squares like a chessboard and covered about 20 acres.

**MESOPOTAMIA.** The story of architecture in Mesopotamia begins some 4,000 years ago during the time of the Babylonian Empire, which was followed by the Assyrian Empire, c. 1380 B.C., the Persian Empire in 538 B.C., and the Greek Seleucid kings in 331 B.C. In the flat Mesopotamian plain, the normal material, even for large structures, was brick, although stone was obtained from the surrounding hills for building some of the later monuments. Glazed and coloured terracotta was much used for decorative features. The chief surviving ruins are of royal palaces, towers, and temples. The "Tower of Babel" is now recognized as an historical fact. During the

Assyrian period, semicircular arches came into common use, but the architecture of Mesopotamia continued to be mainly trabeated, though in some of the Persian palaces the columns, supporting the flat roofs of timber covered with mud, became much more slender and graceful than anything found in ancient Egypt.

#### Crete and Mycenae

Another area where primitive architecture came into being about 4,000 years ago was around the eastern Mediterranean, especially Crete with its great royal palace at Knossos; and Mycenae on the mainland of Greece. Here the surviving buildings are of stone, and one large circular tomb at Mycenae, 50 ft. in diameter, is roofed like a dome but each course of stone is horizontal and slightly overhangs the one beneath, which is not proper domical construction.

ORIGINS OF EUROPEAN ARCHITECTURE. All subsequent European architecture had its origin in these three early centres of civilization—Egypt, Mesopotamia, and the Aegean—and the architecture of “Hellenic” Greece constituted its first phase, lasting from c. 700 B.C. to 146 B.C., when Greece became part of the Roman Empire. Thereafter, for several centuries, the architecture produced under Greek influence though under Roman auspices is called Hellenistic or Greco-Roman. The preceding (Hellenic) architecture was not derived solely or directly from Crete and Mycenae: Egypt played some part, though perhaps indirectly through Crete. The Greeks developed the clumsy trabeated construction of the Egyptian temples into that refined style which formed the basis of all later European architecture. It was deliberately revived in England and Germany early in the 19th century, so that in London, Edinburgh, Berlin, and Munich there are buildings copied, more or less, from Athenian masterpieces of the 5th century B.C.

Although many of the Greeks lived in handsome houses, the bulk of the population inhabited rude huts, and in the towns the streets were narrow, crowded, and unpaved; but the temples were finely designed. It is especially in them that the merits of Greek architecture are to be found. They had low-pitched roofs covered with tiles of marble or terra-cotta, resting on stone or marble beams supported on walls surrounded by colonnades. The chief temples

(e.g. the famous Parthenon at Athens) were of marble throughout. As the Greek architects gained confidence and skill in craftsmanship, they also developed a keen and subtle aesthetic sense, so that the design of these simple elements—columns and beams—reached a point of excellence in the so-called Golden Age (5th century B.C.) that has never been surpassed.

In later years, the Romans codified the rules of Greek design into a series of architectural “orders” still regarded as so important that they form part of the syllabus for training architectural students today. While Athens contains the finest Greek buildings, others are to be found in the lands colonised by the Greeks: Sicily, southern Italy, and the west coast of Asia Minor.

Rome, supposed to have been founded in 753 B.C., was for many centuries an insignificant village. Buildings of importance began to appear a little before 100 B.C. The surviving remnants of buildings in central Italy older than that date are called Etruscan, because the district was occupied by Etruscan tribes, including the Romans themselves (*see Etruria*). So little of their work survives that its character can be recalled only from literary sources. The chief buildings were small temples with low-pitched roofs projecting boldly at the eaves, but without surrounding colonnades.

#### Roman Survivals

Of Roman architecture, on the other hand, a great deal is known. The finest and largest buildings were in Rome itself and were erected during the 1st–4th centuries A.D. In A.D. 330, the emperor Constantine transferred the capital of the Empire from Rome to Constantinople (previously called Byzantium), and thereafter very little building of note was achieved in Rome. But the main provincial cities all over the vast Empire contained Roman architecture of a less magnificent type; and even in remote Britain there were some fine examples, now in ruins or destroyed.

The chief buildings in Rome were public baths (*thermae*), theatres, amphitheatres, temples, triumphal arches, and imperial palaces. A new type of building was the basilica, originally a public meeting hall often used as a court of justice or an exchange, which came to form the model for Christian churches.

In the crowded streets of Rome and its neighbouring port of Ostia,

land was so valuable that blocks of flats or apartment-houses came to be erected, several storeys high, with shops on the ground-floor. Elsewhere, the larger houses consisted of rooms grouped round an open courtyard. At Verulamium (near modern St. Albans) several such town-houses have been excavated, revealing their mosaic pavements, their central heating by hot-air flues in walls and from a furnace in a basement, and their bathrooms. The numerous Roman “villas” in England were large establishments carrying on farming on a substantial scale, and were similarly provided with mosaic floors, central heating, and baths.

#### Roman Manual on Architecture

The Romans excelled as practical engineers rather than as artists, and borrowed much of their architectural knowledge from Greece. The manual on architecture written in the 1st century B.C. by the Roman architect Vitruvius Pollio shows how closely he had studied Greek buildings and how completely he relied upon Greek precedent. The Romans borrowed the whole system of trabeated construction from the Greeks, but introduced arches, vaulting, and domes—using those elements in the construction of buildings, and the Greek orders of columns and beams for their decoration, as in the Colosseum or Flavian Amphitheatre. In their temples they seldom used arches, vaults, or domes.

Another important innovation of the Romans was concrete, which became one of their favourite building materials and made possible the construction of great vaults and domes. The characteristic features of Roman architecture are solidity and the use of the semicircular arch.

POST-ROMAN DEVELOPMENT. Whereas Renaissance architecture strictly means the revival or re-birth of Roman architecture in the 16th–18th centuries, the term Romanesque architecture means the normal development of architecture in western Europe from the fall of Rome in the 5th century A.D. to the introduction of Gothic architecture at the end of the 12th century. This was a period of great religious activity, especially by the monastic orders, so that a high proportion of the surviving Romanesque buildings are churches and monasteries. Much of the earlier part of the period, after the fall of Rome and before this great



monastic movement, was disturbed, hence its name of the Dark Ages; and of the few buildings remaining in western Europe from the years A.D. c. 500–c. 1000, nearly all are churches.

The old-fashioned terms Saxon and Norman are often used for English Romanesque buildings, erected before and after the Norman Conquest in 1066 respectively, while Romanesque churches in Italy are sometimes called Early Christian or Lombard. Romanesque architecture is specially characterised by its invariable use of round arches. Hardly any dwelling-houses, large or small, have survived, the so-called Jews' Houses at Lincoln and Bury St. Edmunds being very rare examples. Nearly all the people lived in ramshackle huts of timber or of wattle-and-daub.

#### The Byzantine Development

Abreast of the Romanesque period in western Europe, architecture in eastern Europe assumed a somewhat different form and is called Byzantine from the earlier name, Byzantium, of Constantinople. Byzantine architecture retained many Roman features, such as semicircular arches and the orders; but much of its vaulted and domed construction was derived from Mesopotamia and Persia. It spread from Constantinople into Syria, also into Italy at Venice and Ravenna, and later became the model for Russian church architecture. S. Mark's, at Venice, is an 11th-century example; the Roman Catholic Cathedral at Westminster is a 20th-century version of Byzantine architecture.

Mesopotamia was ruled, during A.D. 226–641, by the Sassanid kings whose vast brick palaces contained remarkable vaults and domes. In 641 it was conquered by the Arab hosts of Islam who quickly spread from Persia along south of the Mediterranean to Gibraltar. The earlier buildings of these Arab warriors were chiefly designed for them by Byzantine or Sassanid architects, but in course of time the Muslims evolved a distinctive style for themselves. Long before the introduction of the pointed arch into Europe led to the great change from Romanesque to Gothic, they had been building rows of tall pointed arches of brick, notably in the great mosque of Ibn Tulun at Cairo, A.D. 876–879. The principle of the pointed arch had been known many centuries earlier in the East; but its use on any

substantial scale seems to have been a Muslim innovation, and its introduction into west European architecture at the end of the 12th century is only one of many architectural changes that may have been due to the campaigns of French and British Crusaders in Egypt and Palestine.

THE "GOTHIC" PERIOD. The inaccurate term Gothic is really a nickname. It was coined in the 17th century, when everything Roman was fashionable and everything medieval was out of fashion, to describe a style of architecture which men considered barbarous. It was attributed to the savage Goths who were supposed to have destroyed the ancient buildings of Rome in the 5th century. In fact, few of those buildings were destroyed by the Goths, who were too much occupied with fighting to do more than steal portable loot; rather they fell into decay through neglect. Moreover the Goths had no architecture of their own; and the noble architecture which Wren and his fellow-architects nicknamed Gothic had its beginnings some 500 years after the Goths sacked Rome.

Gothic architecture prevailed from c. 1190 to c. 1500 in the (then Roman Catholic) area of western and central Europe made up of modern Italy, France, Germany, Switzerland, the Netherlands, England, Portugal, Spain, Poland, Hungary, and Scandinavia—in fact, in the same countries where Romanesque architecture had flourished. Eastern Europe, under the Greek Orthodox or Eastern Church, followed the Byzantine style; but as a result of the Crusades there are some fine Gothic churches in Cyprus.

#### Gothic Characteristics

Everywhere Gothic architecture had certain characteristics in common; and followed a more or less similar course of development, from the massive round-arched buildings of the Romanesque period to the marvellous structures of the early 16th century, e.g. Henry VII's Chapel at Westminster and King's College Chapel at Cambridge, among English examples, where an elaborate system of slender stone piers and bold buttresses carries a thin stone vault and allows the greater part of the wall-surface to be occupied by large stained-glass windows. The change began at the end of the 12th century with the introduction of the pointed arch, which solved many problems of vaulting,

and pointed arches of various types are so much the hallmark of Gothic architecture that it has sometimes been called the Pointed Style.

Throughout the Gothic period the Church was powerful, though its influence steadily declined as the 16th century (and the Reformation) approached; and nearly all the most important Gothic buildings are churches of one kind or another—cathedrals, abbeys, priories, and collegiate and parish churches.

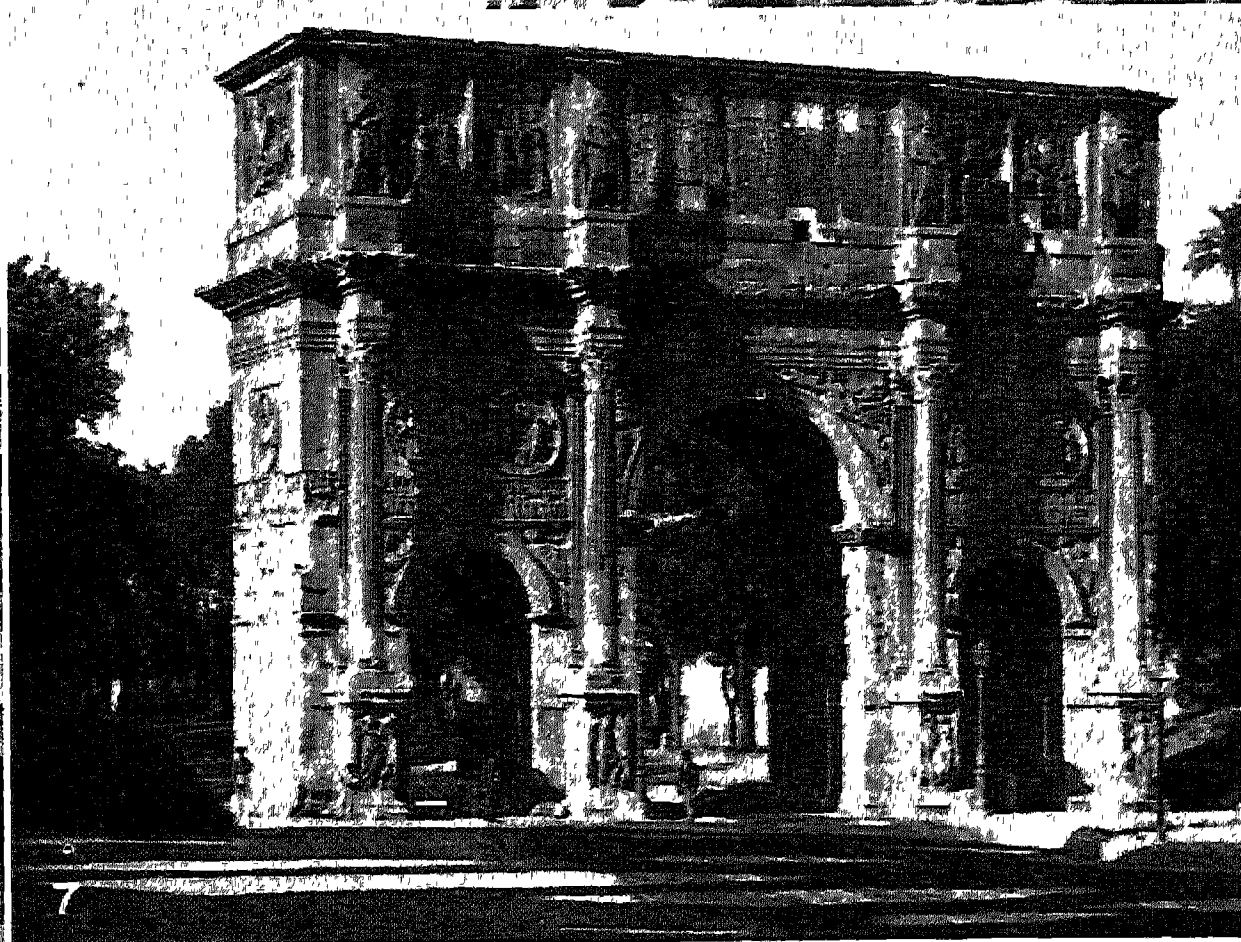
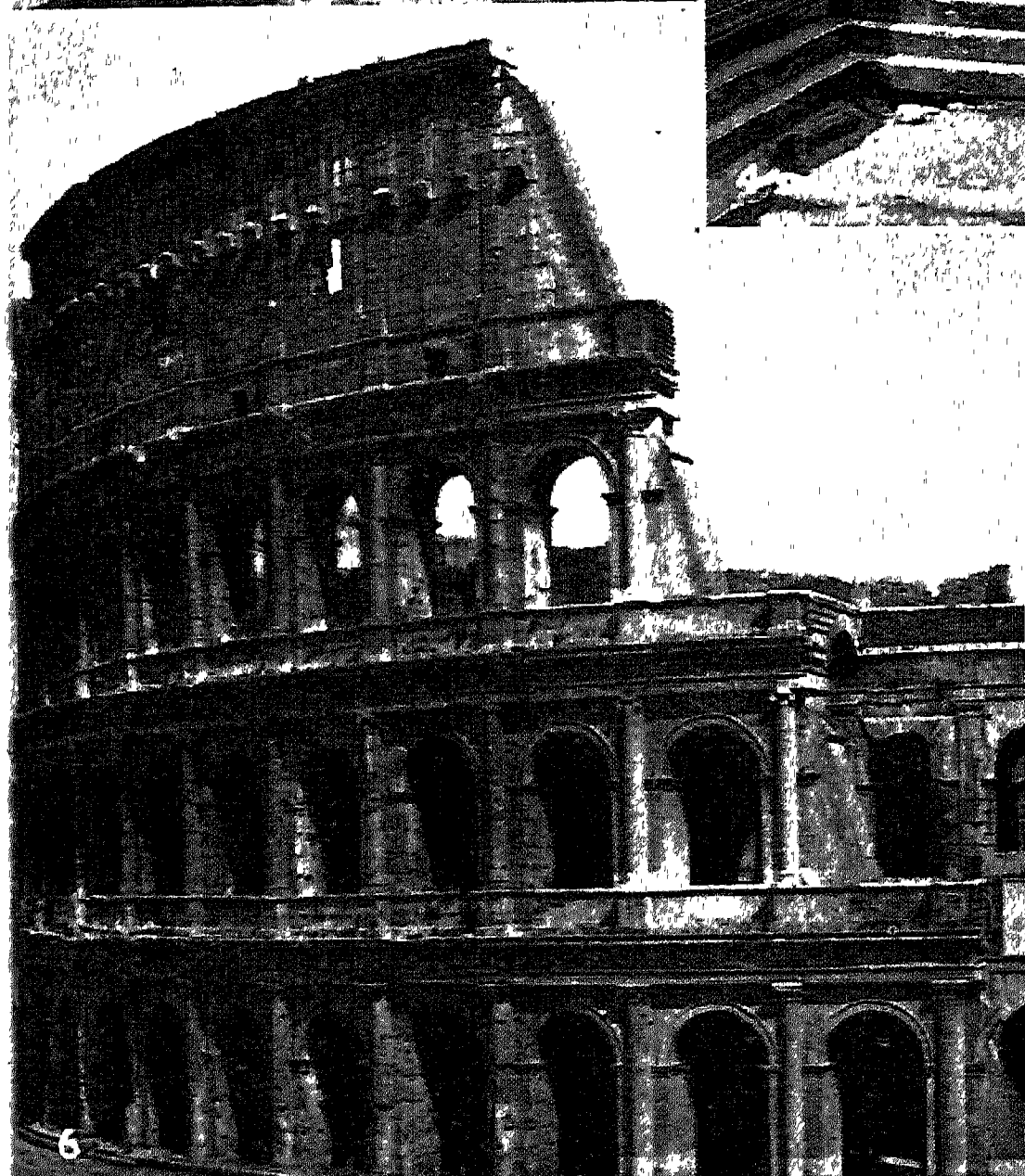
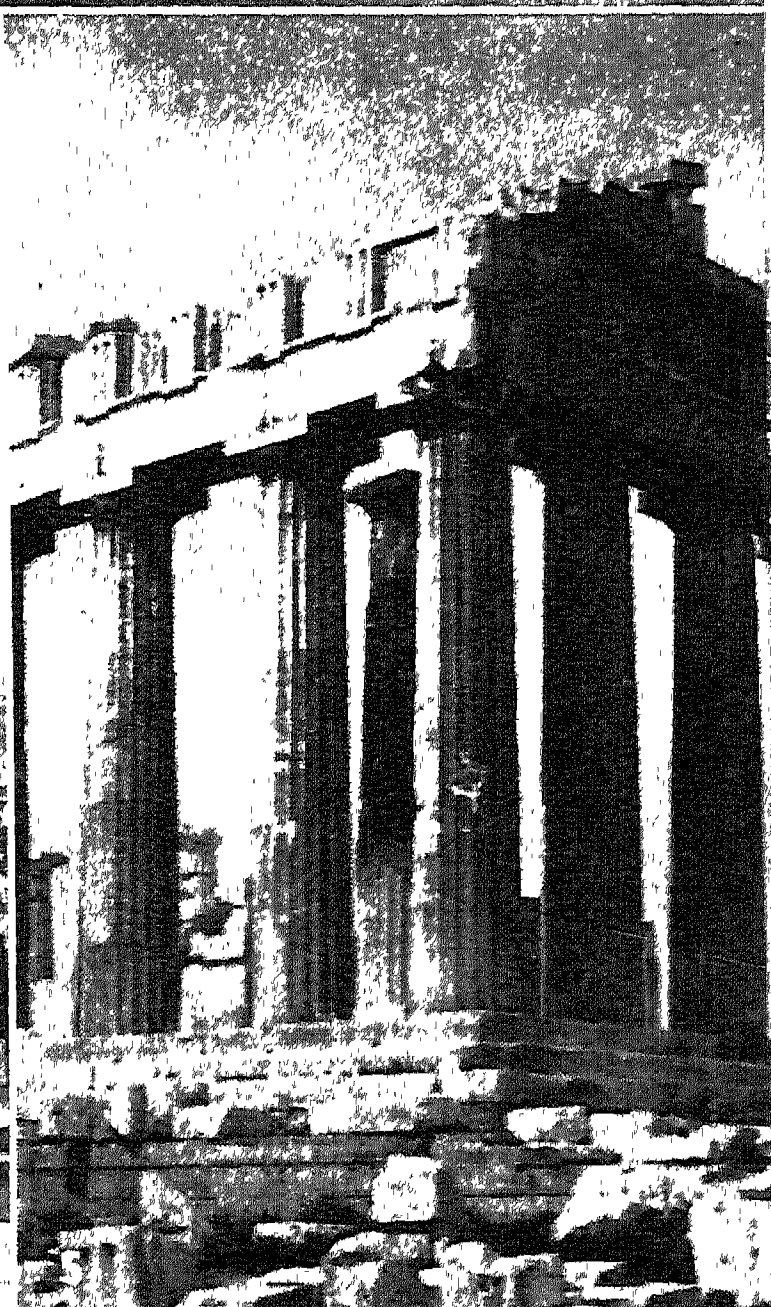
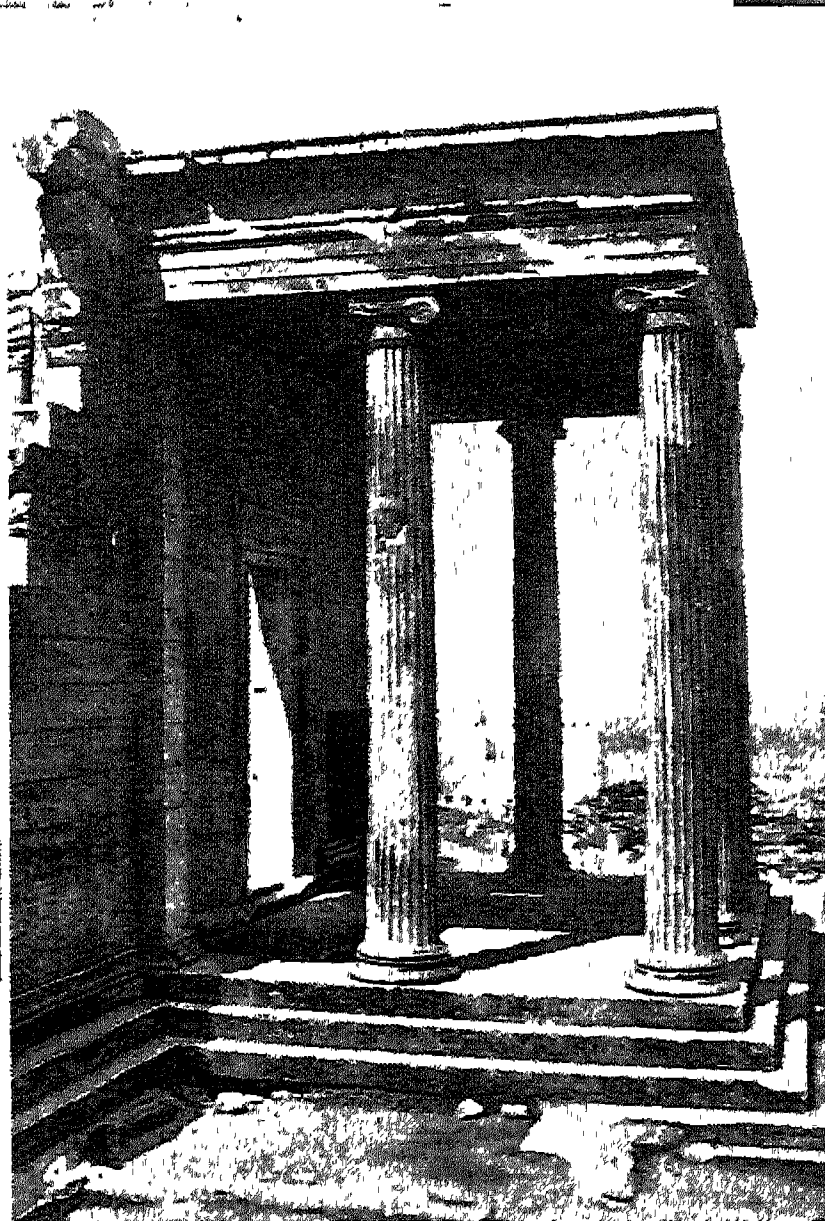
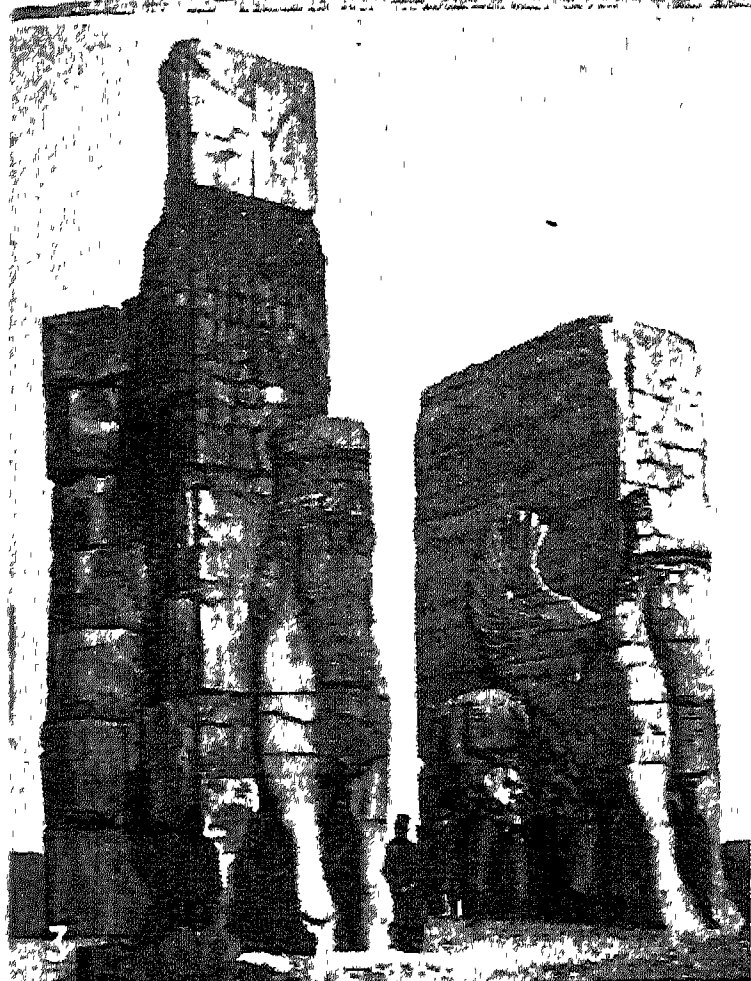
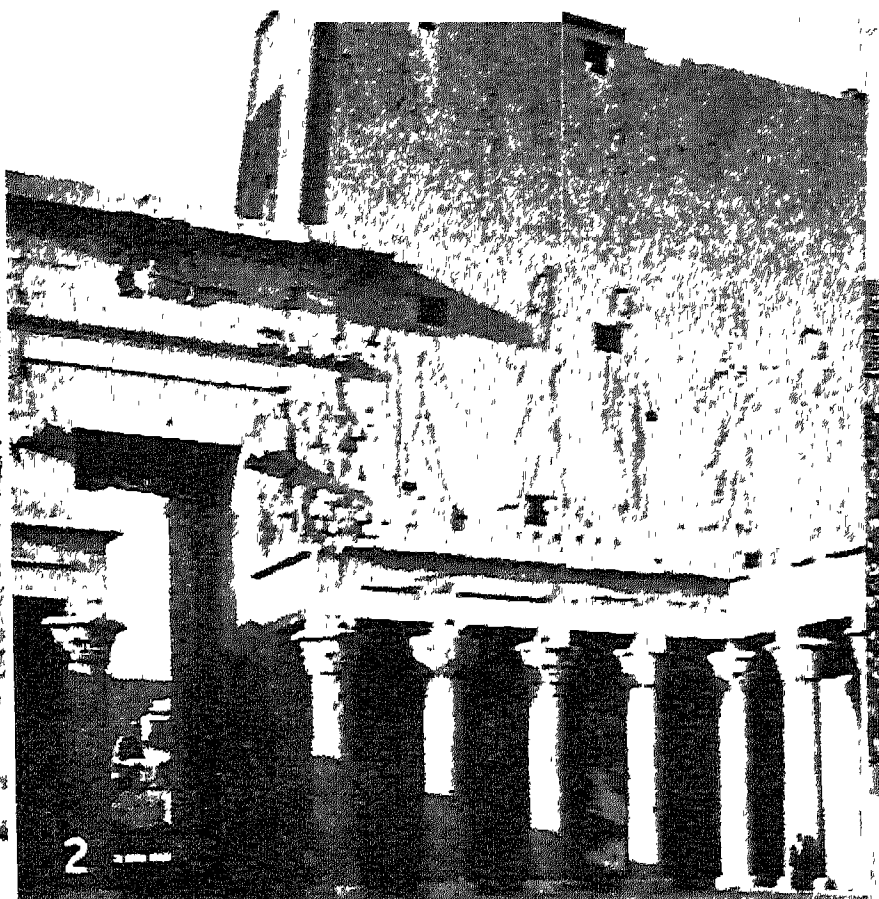
The same style of building was used for the houses of the wealthy in all European countries, though most of the population lived, as they had done throughout the Romanesque period, in timber-framed houses which have perished long ago, or in crazy thatched huts.

THE RENAISSANCE. This steady course of development in Europe was interrupted by the movement called the Renaissance, which brought the revival or re-birth of Roman architecture in its ancient form, very different from the form it had assumed in its slow progress through the Romanesque and Gothic phases. The Renaissance, which affected literature and all the other arts besides architecture, had its birth in Florence early in the 15th century, made its influence felt in the design of Italian buildings a few years later, and reached France and England about a century afterwards.

In Italy, the Gothic fashion had never penetrated very deeply, so that Italian architects easily reverted to their traditional style of design. In France and England, on the other hand, Gothic had taken a very firm hold, and for a long time the new style was confined to small details of Roman ornament applied to essentially Gothic buildings.

English examples are the terracotta busts of Roman emperors and the carving of the Gothic timber roof-trusses, at Hampton Court Palace, c. 1520; and Henry VII's tomb in Westminster Abbey, 1512, the work of an Italian craftsman. These innovations were mainly introduced by rich noblemen and courtiers desirous of displaying the latest London fashions, and for many years hardly penetrated outside this restricted circle. During the reign of Elizabeth I the fashion spread, and Elizabethan architecture, like the Jacobean style which followed it, is a curious blend of the Roman orders and Roman-style ornament with the native English tradition of



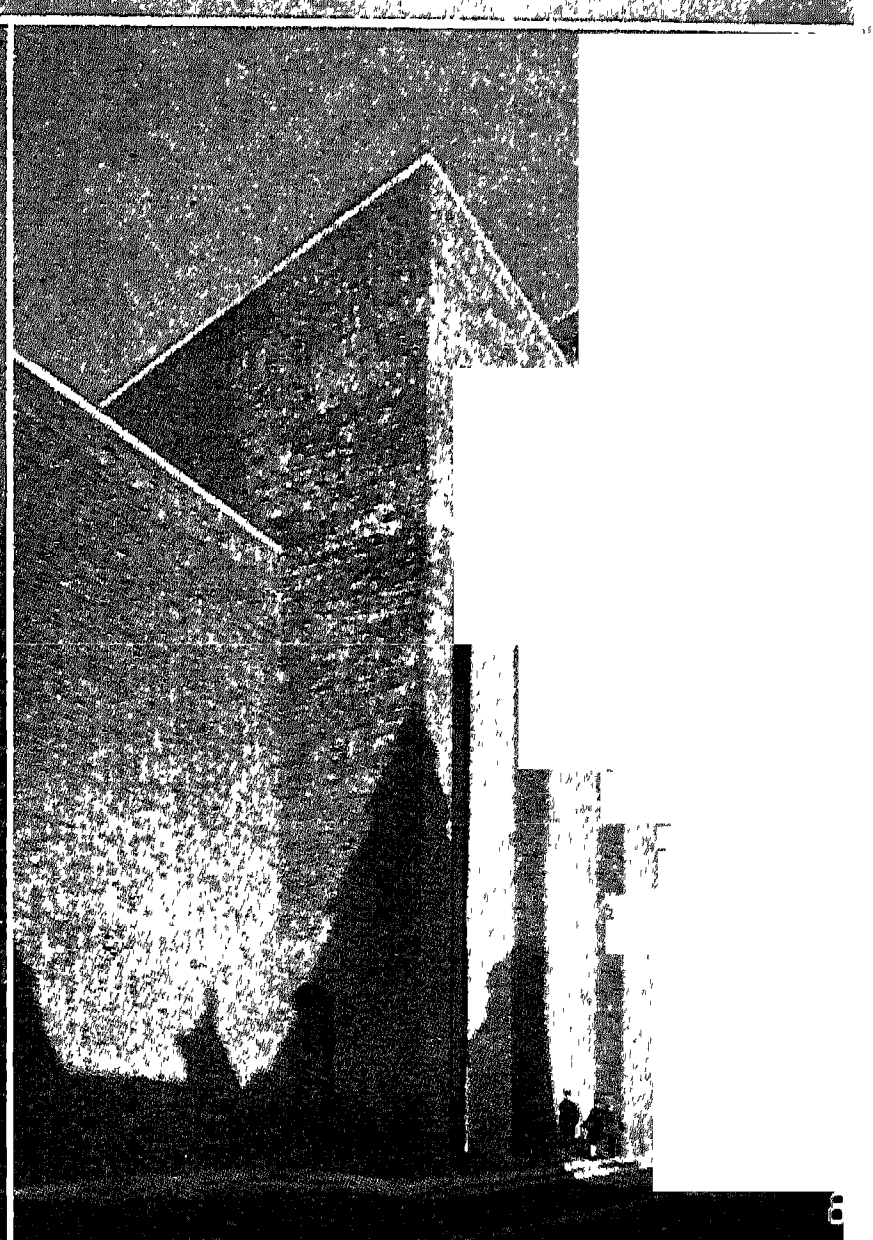
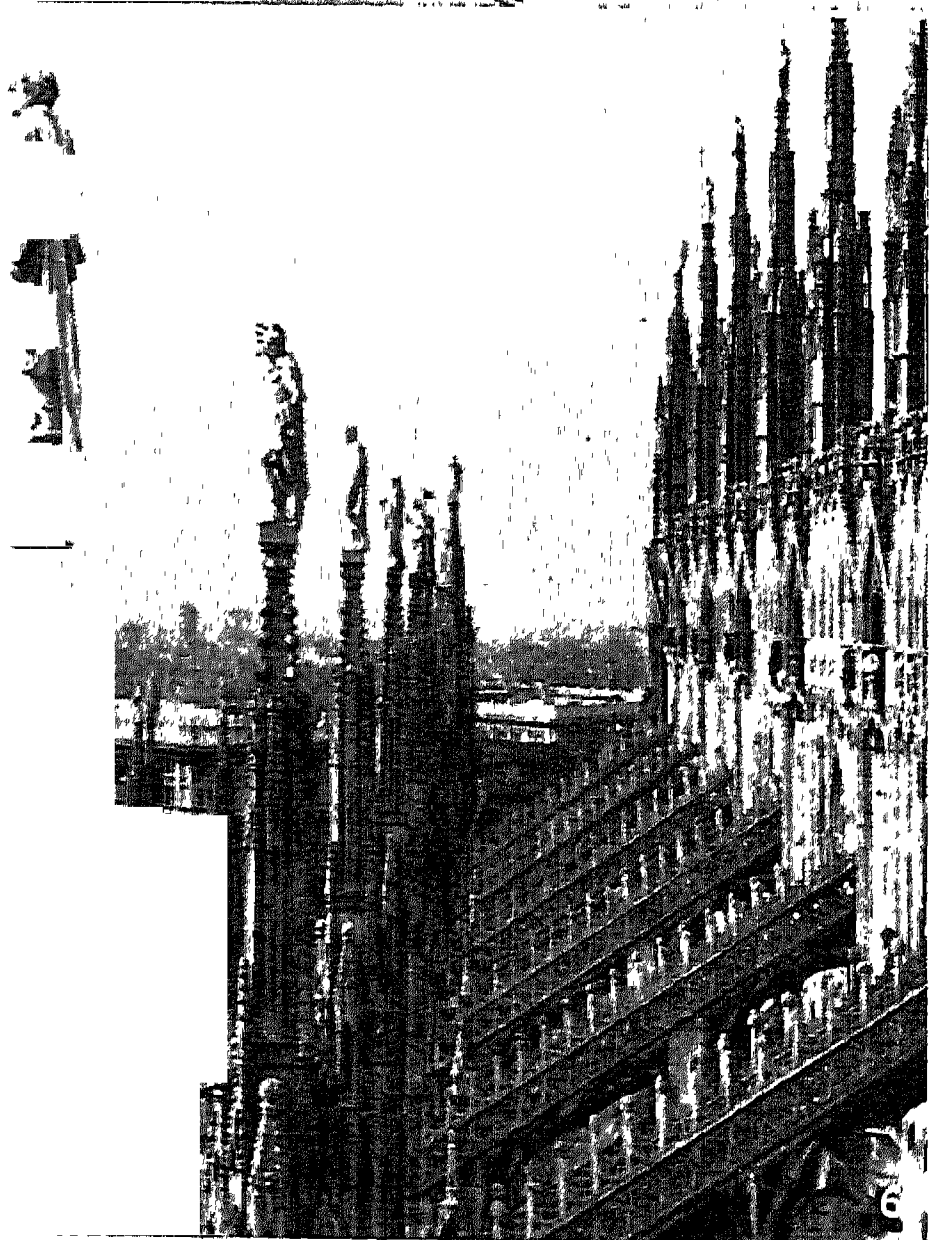
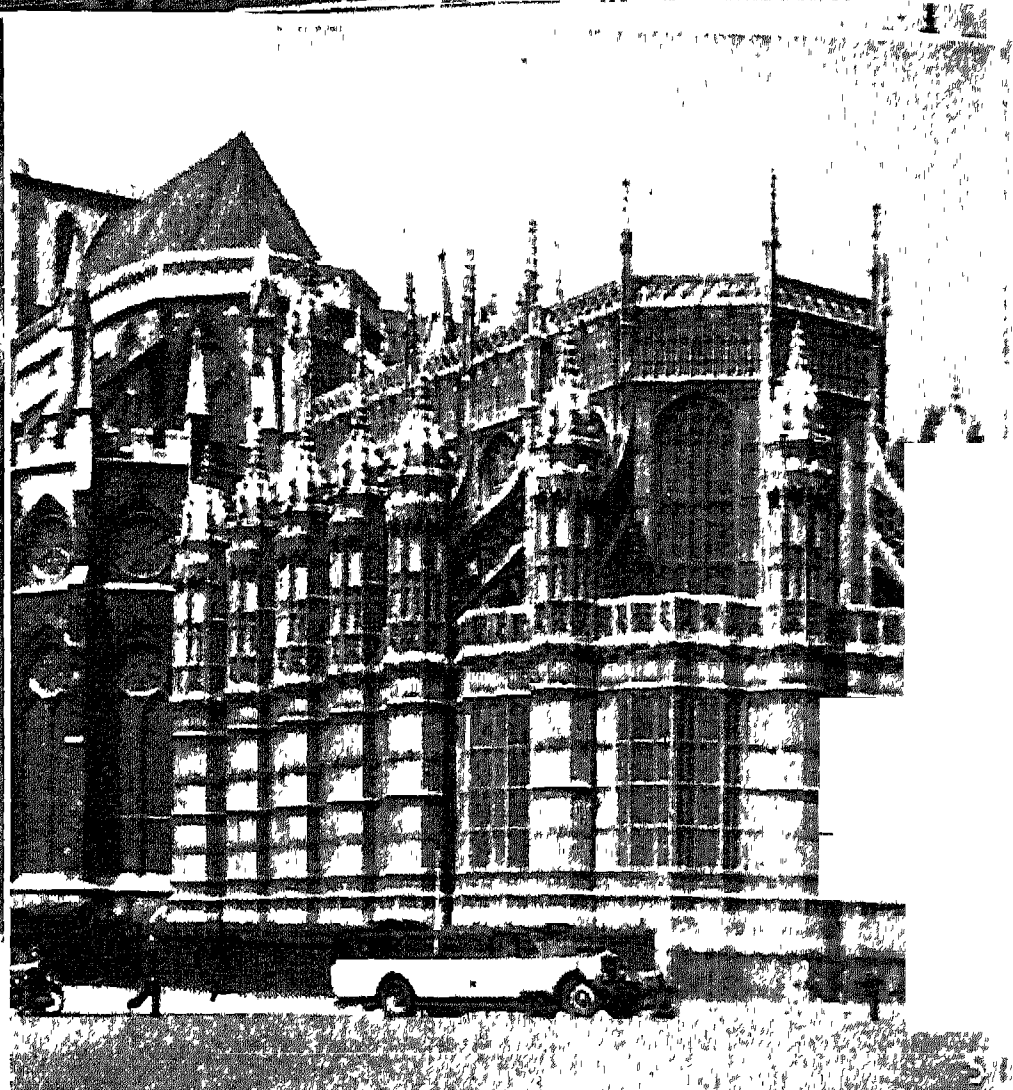
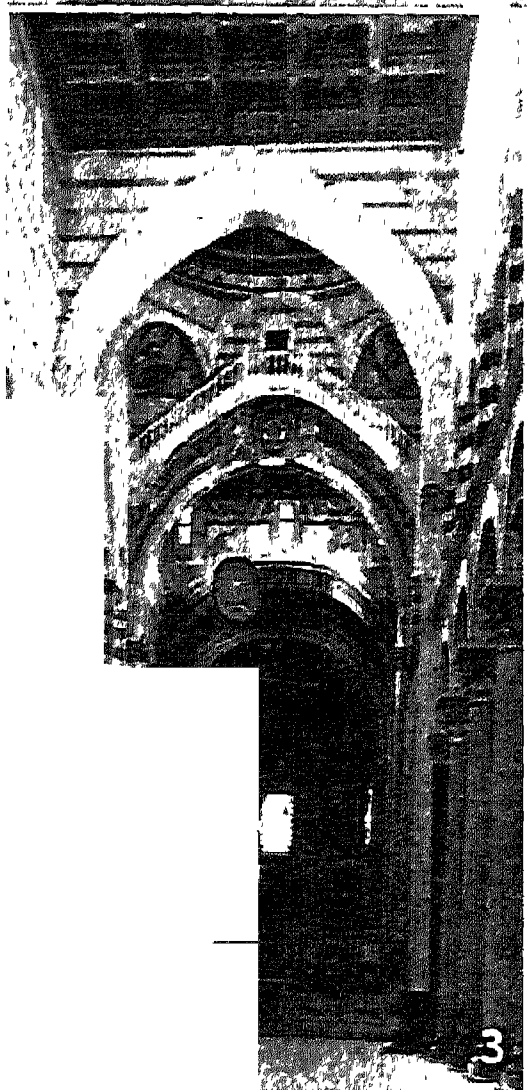
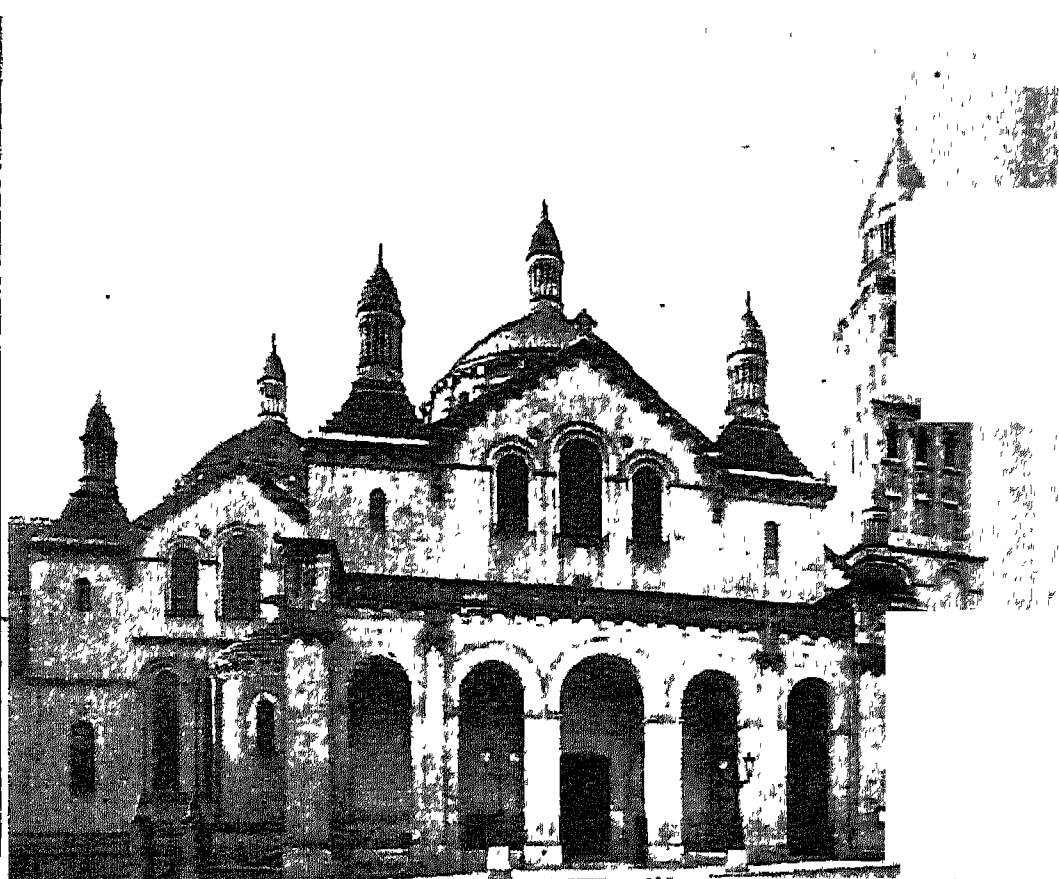
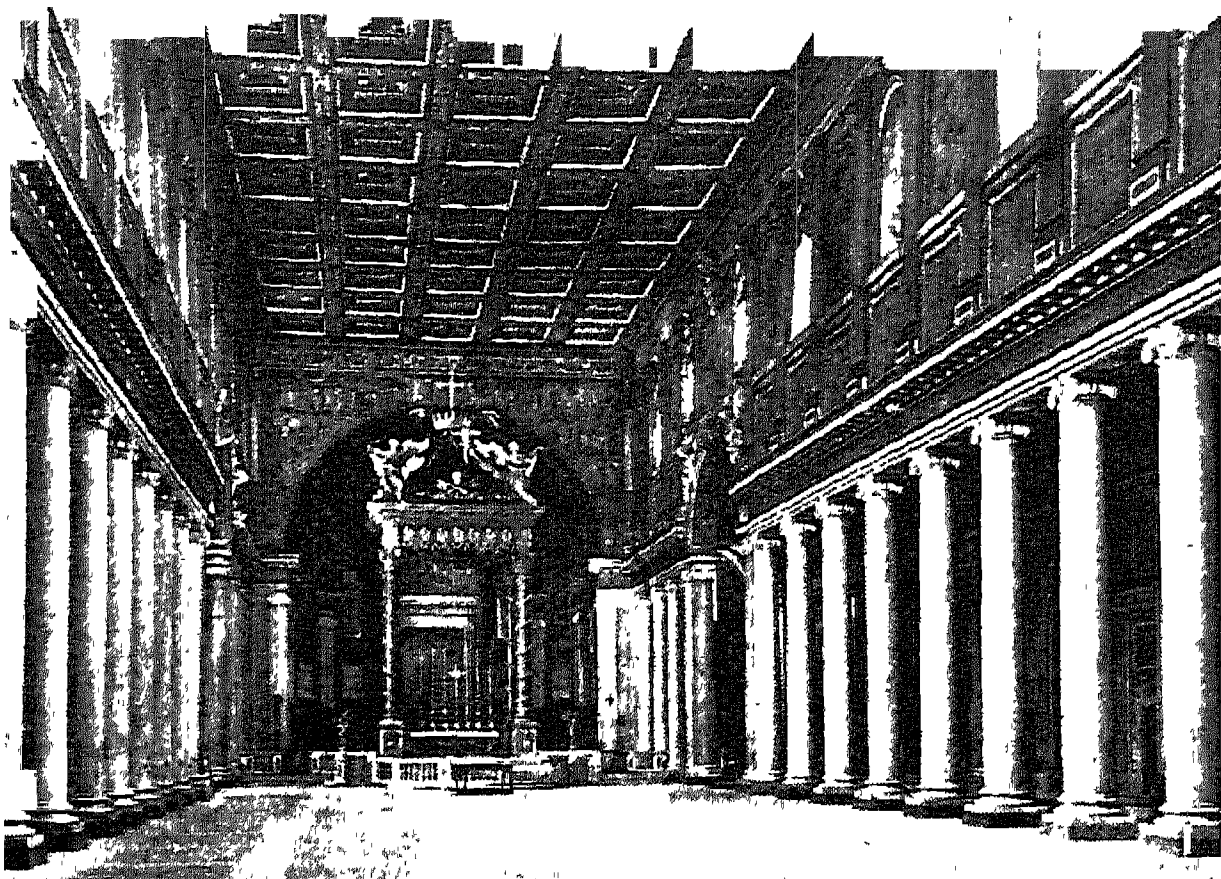


1. Colonnade and portico of the Temple of Luxor, Egypt (c. 1390 B.C.). 2. Massive monolithic pylon at the Temple of Edfu, Egypt (257-237 B.C.). 3. Eastern portal of the propylaea at Persepolis, Persia (c. 460 B.C.). 4. Ionic columns at the entrance to the Erechtheum in the Ac-

polis, Athens (begun c. 437 B.C.). 5. Corner of the Parthenon, Athens, with Doric columns and entablature (447-431 B.C.). 6. Part of the Colosseum, Rome, showing Tuscan-Doric, Ionic, and Corinthian orders (begun A.D. 7). 7. Triumphal Arch of Constantine, Rome (2nd cent. A.D.)

#### ARCHITECTURE : OUTSTANDING EXAMPLES OF ANCIENT AND CLASSIC BUILDINGS



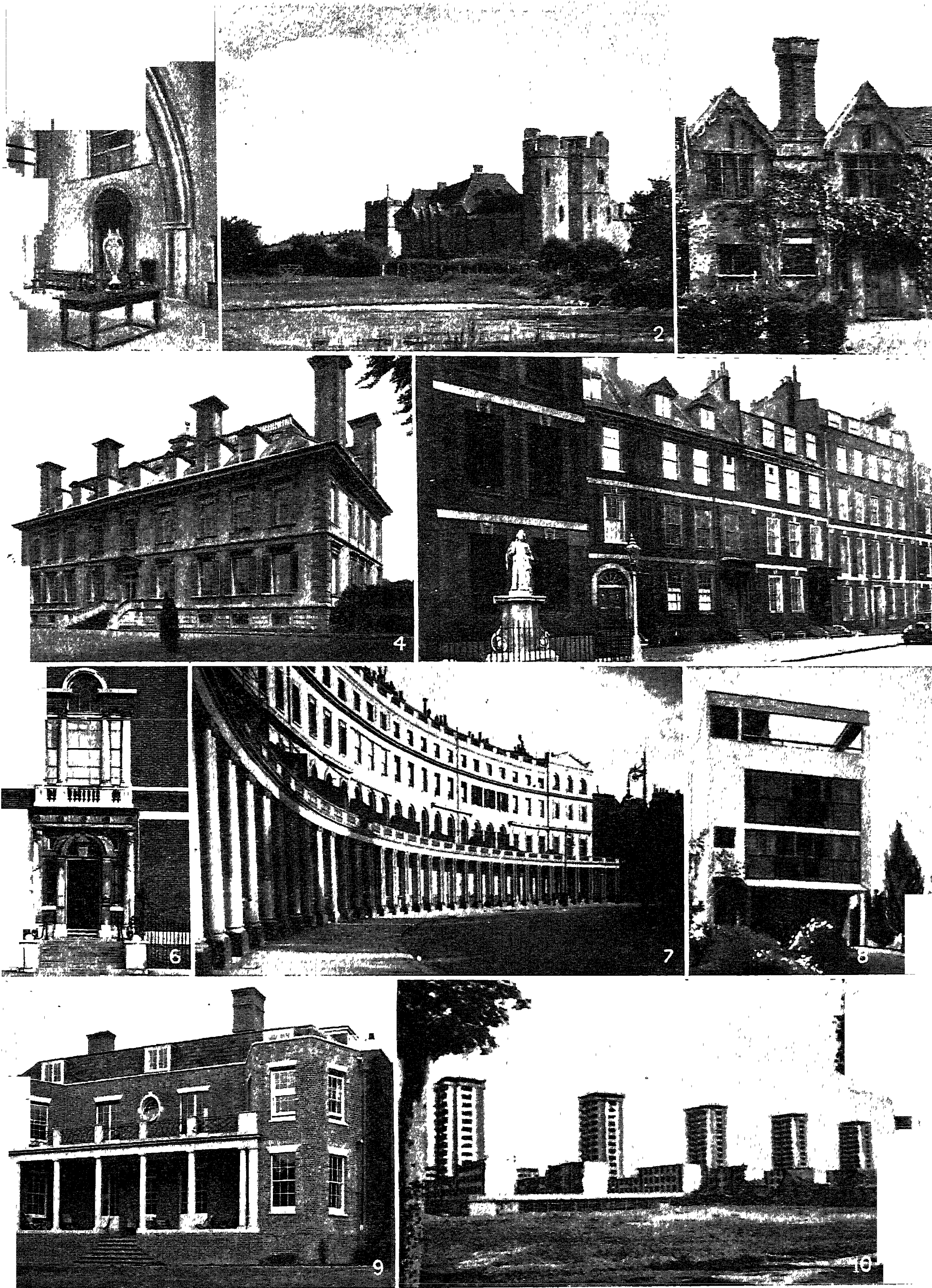


1. Church of S. Maria Maggiore, Rome, early Christian basilica. 2. Périgueux Cathedral, example of Byzantine architecture, cruciform in plan and roofed with five stone domes. 3. Pisa Cathedral, Italian Romanesque. 4. N. door of the Gothic church of S. Wulfram, Grantham. 5. Henry VII's Chapel, Westminster Abbey, late Perpendicular. 6. Flying buttresses and pinnacles of Milan Cathedral, consecrated in 1577. 7. Steeple of S. Mary-le-Bow, one of Wren's London churches. 8. S. Marienkirche, Mülheim, example of modern ecclesiastical architecture

# **ARCHITECTURE: ECCLESIASTICAL STYLES OVER A PERIOD OF NEARLY 1500 YEARS**

*Photos 1, W F. Monsell; 2 and 3, F.N.A.; 4 and 5, Will F. Taylor; 6, Donald McLeish*





1. Interior of the Norman keep at Hedingham Castle, Essex. 2. Stokesay Castle, Shropshire, 13th cent. fortified manor house. 3. Side entrance to Dorney Court, near Windsor, example of Tudor domestic architecture. 4. Coleshill, Berks, 17th cent. country house. 5. Queen Anne's

Gate, London; early 18th cent. 6. Façade of Gwydyr House, Whitehall, built in 1796. 7. Park Crescent, Portland Place, part of Nash's architectural scheme. 8. House at Stuttgart by Le Corbusier. 9. Modern Georgian house by W. J. Palmer Jones. 10. Blocks of working-class flats near Paris

# **ARCHITECTURE: HOUSING DEVELOPMENT FROM PRIVATE FORTRESS TO MODERN FLAT**

Photos, 1, F. Bond; 2, Herbert Felton; 3 and 6, Humphrey Joel; 4, "Country Life"; 5, Langflier; 7, Will F. Taylor; 8, Fredk. Etchells. 9, courtesy of "The Architect"; 10, courtesy of Matthew Nathan





1. Fifteenth century grammar school, Steyning, Sussex. 2. Tudor Guildhall, King's Lynn, Norfolk. 3. George Inn, Southwark (16th cent.); the galleries date from about 1676. 4. Wren's cloisters and chapel at Emmanuel College, Cambridge. 5. Greenwich Hospital, originally designed by Inigo Jones and John Webb and finished by Wren. 6. Radcliffe Library, Oxford, probably the finest work of James Gibbs. 7. Royal Courts of Justice, Strand, built 1874-82. 8. Modern school at Amsterdam. 9. The Town Hall at Stockholm. 10. Factory at Welwyn, Herts. 11. Arnos Grove Underground Station (one of London Transport's modern designs). 12. Pithead baths at Lea Green Colliery, Lancs.

#### ARCHITECTURE : SOME PUBLIC AND COMMERCIAL BUILDINGS OF FIVE CENTURIES

Photos, 1, Dixon Scott; 2, Will F. Taylor; 3, "Country Life"; 4, 5, 7, and 9, Donald McLeish; 6, Newton & Co.; 8, Netherlands Govt.; 11, London Passenger Transport Board



mullioned windows, steep roofs and gables, and even slightly pointed arches—all Gothic features.

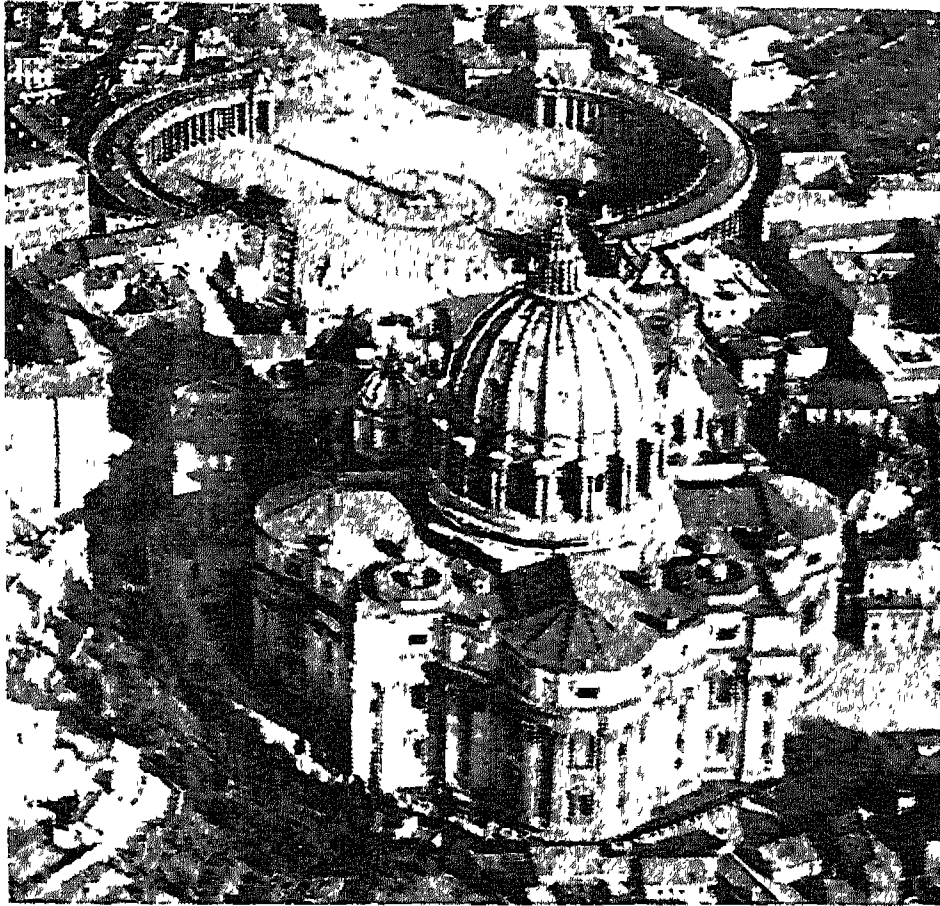
Three points deserve emphasis here: the influence of the Church had waned since the Reformation, and the Dissolution of the Monasteries in 1536-39, so that hardly any new churches were erected between 1540 and 1660; the larger dwelling-houses became much more civilized, spacious, stately, and comfortable, with formal gardens; and many of the smaller houses at last began to deserve the name of architecture: many Elizabethan and Jacobean mansions still survive in England.

The Renaissance in French architecture started on similar lines. The first phase, especially under Francis I (1515-47), produced some of the most picturesque *châteaux* in Touraine, e.g. Chambord, Chenonceaux, and Azay-le-Rideau; also a large part of the royal palaces of Fontainebleau and the Louvre. Steep gables and roofs, dormer windows, and bold chimneys were used in conjunction with Roman decoration and the Roman orders.

In Germany and the Netherlands, the movement bore fruit somewhat later; those countries contain many quaint or florid town halls, market-halls, and dwelling-houses closely resembling the style of English Elizabethan and Jacobean buildings.

This picturesque blend of Gothic and Roman features in English architecture persisted some years after Inigo Jones introduced another drastic change. The Queen's House at Greenwich, c. 1617, which he designed for James I, still more his Banqueting House in Whitehall, 1619-22, are completely Italian in appearance: there is no vestige of Gothic about them. He had studied in Italy, and had the Roman tradition at his fingers' ends. He was a disciple of the Italian architect Palladio. His work was continued, and his new style followed, by his pupil John Webb, at Greenwich and elsewhere.

In France the architect François Mansart (1598-1666) substituted orthodox Italian or Roman design for the more picturesque style of the early 16th century, notably in his masterpiece, the *château* of Maisons near Paris,



Architecture. S. Peter's, Rome, culmination of Italian Renaissance architecture; dome by Michelangelo, colonnade by Bernini

1642-51, in his additions to the *château* at Blois, 1635-38, and in the church of Val-de-Grâce in Paris, 1645-65.

#### Baroque and its Influence

In Continental Europe the first half of the 17th century saw the advent of another phase, Baroque architecture, the visible result of the vigorous Counter Reformation led by the Jesuits. This type of architecture was confined mainly to the countries of southern and central Europe which remained faithful to the papacy after the Reformation, and to their colonies in Central and South America, even at Goa in India; but it left its mark on some of the Protestant countries, England among them. The chief features of Baroque architecture are its unconventionality and its boldness, often degenerating into eccentricity and vulgarity; its prodigal use of colour, gilding, and riotous statuary; its skilful grouping of masses, and its brilliant use of vistas and landscape possibilities.

In England its effects are clearly to be seen in the works of Hawksmoor and Vanbrugh; also, to a less extent, in the buildings of Wren, who was senior to them both but junior to Inigo Jones. Wren's buildings are more English, French, or Dutch than Italian; and, while picturesque and often original, they avoid the excesses of some Baroque on the Continent, where it continued in vogue during the first half of the 18th century, gradually giving way to Rococo, a more graceful product of France.

GEORGIAN ARCHITECTURE. Wren's work was too picturesque

and informal for some of his followers, who reverted to the more orthodox rules of design observed by Palladio, so that their work came to be described as Palladian although it was built a century or more after Palladio's death. One of the leading exponents of this school was the amateur architect Lord Burlington. A large number of enormous mansions in the Palladian style were built in England during the reigns of the first three Georges.

Such buildings, and many smaller ones, are included in the general term Georgian architecture, which is usually taken to include the work of the Brothers Adam and the

later phase called the Regency period. In France, the period of Wren and his disciples was dominated by Louis XIV (1643-1715) and his favourite architect J. M. Mansart (1646-1708), who designed, among a host of great buildings, much of the royal palace of Versailles, and the fine church of the Invalides in Paris. The reigns of Louis XV and Louis XVI gave names to the lighter style that followed.

Church architecture in England began to revive after the Restoration in 1660, but the churches built between that date and c. 1820 were of a very different type from those of the Catholic Middle Ages. Not only the famous 50 City churches designed by Wren after the Fire of London in 1666, but also those which followed during the next century were planned as Protestant preaching-houses, often furnished with galleries and embellished with Roman columns. The meeting-houses of the various Nonconformist bodies which had grown up since the beginnings of dissent in the days of Elizabeth I were similarly designed, though on an even more austere pattern and without the spires which graced most of Wren's churches.

This was the position of architecture at the accession of George IV, a patron of the arts already while he was Prince Regent—hence the name Regency Style.

GREEK AND GOTHIC REVIVALS. Then came a profound change in the architecture of the U.K., of other European countries, and of the United States of America. The delicate and elegant designs



created by the Brothers Adam had followed the Greco-Roman or Hellenistic style of Pompeii, but British architects who had actually studied in Greece now began to put the clock further back still, and introduced the Greek Revival, with the result that imitations of the Greek buildings of 5th-century Athens began to appear in London, Edinburgh, Glasgow, Cambridge, and elsewhere. The Greek revival also had a considerable vogue in Berlin and Munich.

Abreast of this movement, and perhaps partly in protest against it, arose the Gothic Revival, which held the field in the U.K. for 50 or 60 years. Even in the 18th century a few attempts had been made to revive Gothic architecture, notably by Horace Walpole in his villa at Strawberry Hill, 1747-97, but not until the reign of William IV did this movement attain importance. It then became fashionable to design most churches in what was, at first, a very feeble imitation of Gothic architecture; and after the houses of parliament were burnt down in 1834, it was decided that they must be rebuilt in the Gothic style, with the result that may be seen today; the architect was Sir Charles Barry (1795-1860). Gothic architecture now became customary for churches everywhere, even for Nonconformist chapels, and during the middle years of Victoria's reign was enthusiastically adopted for public buildings, too: e.g. St. Pancras station, 1865-71; Glasgow University, 1860-70; Leeds infirmary, 1863; Manchester town hall, 1868-77; and the Royal Courts of Justice, Strand, London (1874-82). Examples of the Gothic Revival are also to be found in Germany, France, Belgium, the Netherlands, the U.S.A., Canada, Australia, and India, but nowhere are they so numerous or important as in the U.K.

Gothic architecture was no doubt appropriate enough for the Roman Catholic ritual of the Middle Ages, even for the Anglican Church in the 19th century, but was certainly not suitable, on practical grounds, for a railway-station, a hospital, or a town hall. With its elaborate carving and its traceried windows, it was equally inappropriate for modern dwelling-houses; and before the end of the century architects were beginning to feel misgivings on this score. Some of them, still obsessed by the idea of copying historical styles, reverted to "Elizabethan"

# ARCHITECTURE: THE MAIN HISTORIC STYLES AND PERIODS

STYLE, DATE, AND SUBDIVISIONS	PRINCIPAL FEATURES
<b>GREEK</b> 7th century B.C. to 3rd century A.D. <i>Archaic Period, lasting to the 5th century B.C.</i> <i>The Golden Age, 5th to 4th centuries B.C.</i> <i>Hellenistic Period, 4th century B.C. to 3rd century A.D.</i>	Principal materials: Wood, clay, stucco, and stone. The basis of Greek architecture was lintel and post construction, the use of the arch being almost unknown. The column and capital were of three kinds, known as the orders: Doric, Ionic, and Corinthian. The Corinthian was developed, to the exclusion of the others, during the third (Hellenistic) period. The greatest period of Greek architecture was the 5th century B.C., during which the Parthenon was built
<b>ROMAN</b> 2nd century B.C. to 4th century A.D.	Roman architecture took from the Greeks their three orders: Doric, Ionic, and Corinthian, and added a fourth (Composite) order of its own. From the Etruscans it borrowed the arch and vault, and these were developed into the outstanding features of the Roman style. Massiveness and solidity were characteristic of their buildings, which consisted of temples, baths, aqueducts, theatres, etc. The finest monuments, e.g. the Pantheon and Colosseum, were erected during the Imperial regime. Traces of public buildings and villas may be found wherever the Roman power penetrated. Concrete was much used
<b>BYZANTINE</b> 4th to 12th centuries	The great feature of Byzantine building is the dome, more particularly the dome fitted on to square or octagonal apartments, by means of pendentives. By means of the "cushion" capital, they were also the first builders to "spring" the arch direct from the summit of the column without the use of an intervening entablature. Brick is the principal material in Byzantine building. The most notable monument of the style is the mosque (originally the church of S. Sophia) at Istanbul (Byzantium), completed A.D. 537. S. Mark's, Venice, is a typical example of Italian 11th-century Byzantine
<b>ROMANESQUE</b> 9th to 13th centuries, including <i>Norman, 11th to 13th centuries</i>	Romanesque is really the counterpart in north and west Europe of the Byzantine style, and it developed chiefly in response to the needs of religious ritual. The cushion capital and the barrel vault are both characteristic of Romanesque, as of Byzantine, and similarly the apse (see illus. p. 509) is a prominent feature of the Romanesque church. Examples: Pisa Cathedral; S. Zeno Maggiore, Verona; S. Trophime, Arles; S. John's Chapel, Tower of London; most of Durham Cathedral
<b>GOthic</b> 11th to 15th centuries, in Western Europe, including <i>English Gothic: (1) Early English (13th century), (2) Decorated (14th century), (3) Perpendicular (15th century)</i>	The distinguishing feature is the pointed arch, as opposed to the round arch. Windows are filled with tracery work, the massive piers of Norman architecture give place to clusters of columns, and capitals are rounded. Verticality is the principle underlying Gothic architecture, and the walls and towers of Gothic cathedrals rise to a great height, the buttress usually being used as a support. Siena Cathedral is a fine example of Italian Gothic, and in France, Chartres Cathedral (early 13th century) represents the style at its most magnificent. In English Gothic, the extensive use of ornament was developed during the Decorated and Perpendicular periods. Examples are to be found in the great cathedrals, abbeys, and churches such as Canterbury, York, Worcester, Salisbury, Westminster Abbey, etc., as well as many beautiful old parish churches
<b>RENAISSANCE</b> 15th to 18th centuries <i>Italian Renaissance</i> <i>French Renaissance (Neo-Classical)</i> <i>English Renaissance: (1) Tudor (16th century), (2) Jacobean (17th century), (3) Georgian (18th century)</i>	A reversion to the classic principles, modified by the general humanistic influences of the time. Fine planning, proportion, and scale were aimed at, and ornament selected with discrimination. Wren drew his inspiration for his Renaissance masterpiece, S. Paul's Cathedral, London, from S. Peter's, Rome. In English Renaissance a combination of brick and stone was used, e.g. at Hampton Court. A monumental instance of the late Renaissance style applied to domestic building is Vanbrugh's grandiose Blenheim Palace
<b>ORIENTAL</b> 6th century B.C. to 18th century A.D. <i>Mahomedan Architecture, 7th to 17th centuries A.D. (Egypt, Syria, Mesopotamia, Persia, Asia Minor, North Africa, Sicily, Spain, Turkey, India)</i> <i>Buddhist Architecture, 6th century B.C. to 7th century A.D. (India)</i>	Assumed a great number of local characteristics, differing according to diversities of climate and material. The dome, horseshoe arch, and minaret are outstanding features. Construction is mainly light and flimsy compared with western architecture. Ornamentation is generally very rich and, particularly as regards Indian varieties, fantastic. Colour is freely used. Good examples are innumerable; but the rich decoration characteristic of the Moorish style is probably seen at its best in the Alhambra, Granada; while the beautiful proportions and symmetry of the Taj Mahal, near Agra, reveal the underlying kinship of all great design, in whatever style it may be expressed

for houses, while retaining Gothic for churches. Their leader in the U.K. was Norman Shaw (1831-1912) whose lay-out of Bedford Park near London, 1878, as an early "garden suburb" showed a move in a new and welcome direction.

**TWENTIETH CENTURY DEVELOPMENT.** With the dawn of the 20th century British pride and prosperity reached its peak, marked by such imposing or ostentatious buildings, all more or less in the Renaissance style, as the Queen Victoria memorials in London, 1911-13, and Calcutta, 1906-21; the Port of London Authority building, 1912; County Hall, 1912-22; the Victoria and Albert Museum, 1909; and the magnificent group of civic buildings at Cardiff, 1899-1906.

At the same time a very different tendency was at work: towards a simpler type of domestic architecture, essentially rustic and English in character, which, while often assuming a rather precious "old-world" appearance, was at least sensible and not a mere copy of obsolete models. Prominent in this field was C. F. A. Voysey (1857-1941), whose name soon spread all over Europe, although he designed no great public building or imposing church or cathedral. The foundation of the new or revived art of town-planning had been laid at Port Sunlight, 1888, and Bournville, 1890. Later, Ebenezer Howard (1850-1928) and Raymond Unwin (1863-1940) established the first "garden city" at Letchworth, Hertfordshire, in 1903. This was followed by the Hampstead garden suburb in 1907 and by Welwyn garden city in 1920. Revived Gothic was not yet entirely discarded for churches, and was chosen for the great new Anglican cathedral at Liverpool; a variant of Roman Renaissance was preferred for the large new Roman Catholic cathedral in the same city.

#### The "Modern" Movement

Meanwhile new ideas were beginning to permeate the architecture of Continental Europe during the early years of the 20th century. The chief pioneers of this so-called "modern" movement were Henri van de Velde (b. 1863) and Peter Behrens (1868-1940) in Germany; Otto Wagner (1841-1918) and Adolf Loos (1870-1933) in Austria; and H. P. Berlage (1856-1934) in the Netherlands. In general, the work of all these men was simple, free from imitation of historical

styles, and reasonably expressive of function and structure.

The First Great War interrupted all these developments in 1914, and at its close an impoverished U.K. set to work to re-house its returning soldiers. For that purpose, and also to remove the scandal of the slums about which the national conscience was becoming uneasy, new suburbs were laid out all over Great Britain on garden-city lines, with mainly semi-detached houses sprawling over the countryside. These houses were simple enough, owing to scarcity of labour and materials. The need for economy extended to public buildings, so that the historical styles came to be almost completely discarded.

#### First "Skyscraper"

Tall office-buildings and factories of iron-framed construction had come into general use half-a-century earlier (especially in the U.S.A., where the first "skyscraper" had been erected in Chicago 1887-88), and had already been superseded by steel framing before 1900. About that date, ferro-concrete or reinforced concrete had been invented in France, but was not introduced into the U.K. on any large scale before 1920. With it came the flat roof, and a great increase of glazed window-area, a fashion that gradually spread to dwelling-houses.

The Second Great War caused another change in architectural development. The nations were poor, immense destruction had been wrought by bombing, and shortage of labour and materials was desperate. Partly as a result of these limiting conditions, partly in consequence of a subtle change in architectural taste, austerity became the watchword of the day, and buildings of all types became progressively starker.

There was a great increase in the use of synthetic materials to combat shortages of bricks and timber. In order to reduce delays due to bad weather and other difficulties on building sites, extensive recourse was had to prefabrication, i.e. the manufacture in factories of all possible components of buildings of all types, including dwelling-houses. To facilitate this process, the standardisation of all such components was systematically undertaken.

The result of these various post-war expedients was a new, extremely austere architecture, of a cosmopolitan or international type common to all civilized countries.

Strange and forbidding as it appeared to the eyes of many older people accustomed to traditional forms of building, it was not without many merits of its own.

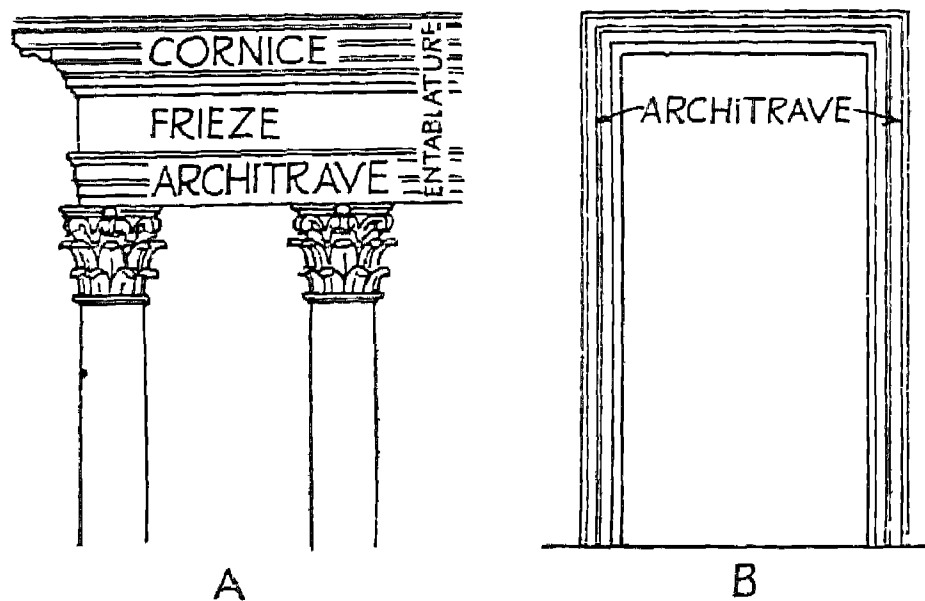
British architecture ceased to display national characteristics and came to resemble closely the architecture of other countries because foreign influences were once more at work. About 1900, the eyes of British architects were turning cautiously towards Vienna; during 1920-25 or so they looked enviously on the rapid progress made in housing and other building in the Netherlands, which had remained neutral during the First Great War.

After a brief flirtation with Scandinavia, still conducted spasmodically, interest shifted to France, where wonderful things were being done with reinforced concrete, and where the Swiss architect Le Corbusier (b. 1887) was preaching a new gospel of "functionalism"; also to Germany, where Walter Gropius (b. 1883) had founded his Bauhaus in 1918.

The outbreak of the Second Great War, and the political persecution immediately preceding it, drove Gropius and most of his brilliant disciples and colleagues to America, where they remained, and where their influence upon contemporary architecture continued to be profound, though Frank Lloyd Wright (b. 1869) among American-born architects was equally influential. He introduced not only much originality into American architecture, but also reinforced concrete into important buildings in Japan.

**Bibliography.** The Architect in History, M. S. Briggs, 1927; Towards a New Architecture, Le Corbusier, Eng. trans., 1927; Short Critical History of Architecture, H. H. Statham, 1927; Glossary of Architecture, T. D. Atkinson, 1928; Short Dictionary of Architecture, D. Ware and B. Beatty, 1944; Outline of English Architecture, A. H. Gardner, 1946; Architecture, M. S. Briggs, 1947; History of Religious Architecture, E. A. Short, 1951; Outline of European Architecture, N. Pevsner, new ed., 1951; A History of Architecture on the Comparative Method, Sir Banister Fletcher, 16th ed., 1954; Dictionary of Architecture and Architects, M. S. Briggs, 1954; The Pleasures of Architecture, A. Williams-Ellis and Clough Williams-Ellis, new ed., 1954; Architecture of England, F. Gibbard, 2nd ed., 1954; History of Architectural Development, F. M. Simpson, vol. 2. 1955, vol. 1. 1956.



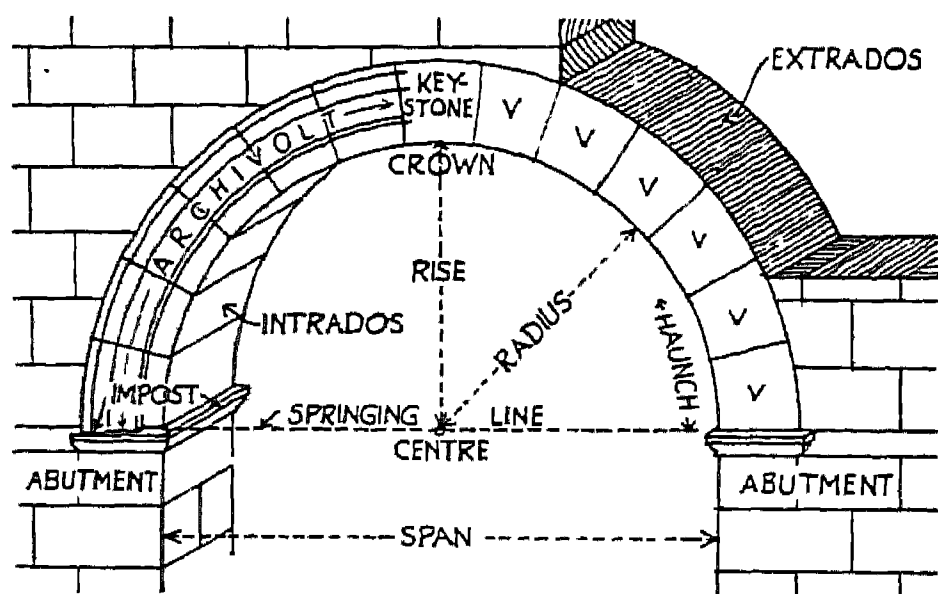


Architrave. A. As the lowest member of the entablature on a classical column. B. As a frame round a doorway

**Architrave** (Gr. *archi-*, chief; Latin *trabs*, beam). Term in classical architecture. The architrave is the lowest member of an entablature, i.e. the stone beam carried by the capital of the column and supporting the frieze above it. It is essentially a feature of lintel and post construction, and disappears with the rest of the entablature from the matured styles of arch construction wherein the arch springs direct from the capital.

In modern building an architrave is a plain or moulded strip around a door or window opening which covers the joint between plaster and woodwork.

**Archivolt** (Ital. *archivolto*). In Roman and medieval architecture, a term applied to an architrave which is carried round a curved opening. The archivolt's development followed that of the semi-circular arch, and in Romanesque, Gothic, Mahomedan, and Renaissance architecture great attention was paid to the decoration of this



Archivolt. A diagram illustrating the relationship of the archivolt to the other parts of an arch. The parts marked V are called voussoirs

member with carved or plain mouldings and contrasted colours.

**Archon** (Gr., ruler). Name of the chief magistrate in towns of ancient Greece, especially of the nine chief magistrates of Athens. When the kingship was abolished, one archon was appointed for life

the term being subsequently limited to ten years and eventually, when a board of nine was instituted, 683 B.C., to one. The manner of their election varied from time to time—by the Areopagus, by the ecclesia, by lot. As the powers of the democracy increased, the functions of the

archon became mainly judicial and religious. The chief officer was called simply archon; the title *eponymos*, often attached to him, does not mean that the year of his office was named after him, but that his name headed all the official lists and documents. He exercised jurisdiction in matters affecting family rights and guardianship, and arranged the feasts of Thargelia and Greater Dionysia.

The archon Basileus (king), who succeeded to the priestly functions of the kings, supervised the Eleusinian mysteries and various sacrificial rites. The archon Polemarchos (war chief) was originally head of the war office, but his functions were subsequently restricted, chiefly to arrangements in connexion with the burial of fallen warriors and the status of foreigners and resident aliens. The remaining six archons, called Thesmothetae (lawgivers), saw that the law was properly administered. Even after Greece

had lost her political independence the office of archon was highly esteemed, and Roman emperors did not disdain to hold it. It disappeared in the reign of Theodosius II, 408–450.

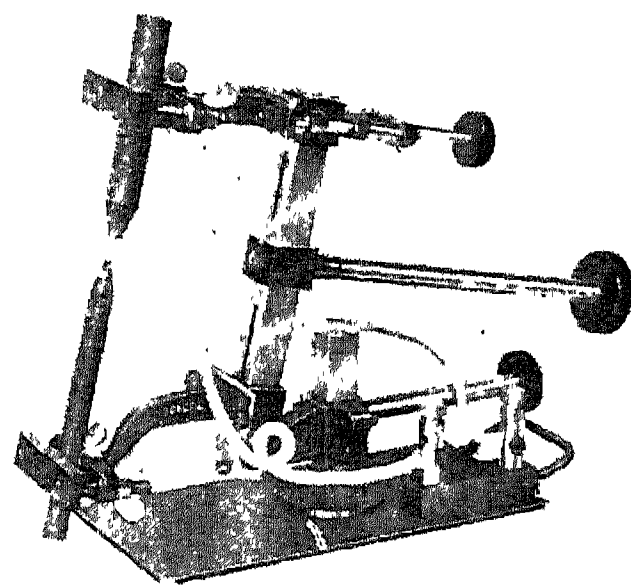
**Archpriest** or **Archpresbyter** (Gr. *archi-*, chief; *presbyteros*, elder). Title given in the 4th century to

the principal, usually the senior, priest of a diocese. In a cathedral he acted as the bishop's representative; in rural districts his relations to the local clergy were the same as those of a cathedral archpriest to the other cathedral clergy. In time the cathedral arch-

priest became the dean, the rural archpriest the rural dean. Their privileges were often usurped by laymen. In England, between 1598 and 1623, archpriests appointed by the pope had jurisdiction over the Roman Catholic clergy; in 1623 they were superseded by a vicar-apostolic.

**Arcing Horns.** Protective devices fitted to the insulators supporting high voltage transmission lines. Under fault conditions high voltage surges occur on transmission lines, which cause breakdown along the surface of the insulators, and may permanently damage them. The discharge can be diverted by fitting two rods (the arcing horns), one to each end of the insulator, so that the discharge path is between them rather than along the insulators.

**Arcis-sur-Aube.** Town of France, in the dept. of Aube. On the river Aube, 16 m. N.N.E. of Troyes, it manufactures hosiery. Danton was born here. On March 20–21, 1814, Napoleon with 23,000 men fought against 90,000 Aus-



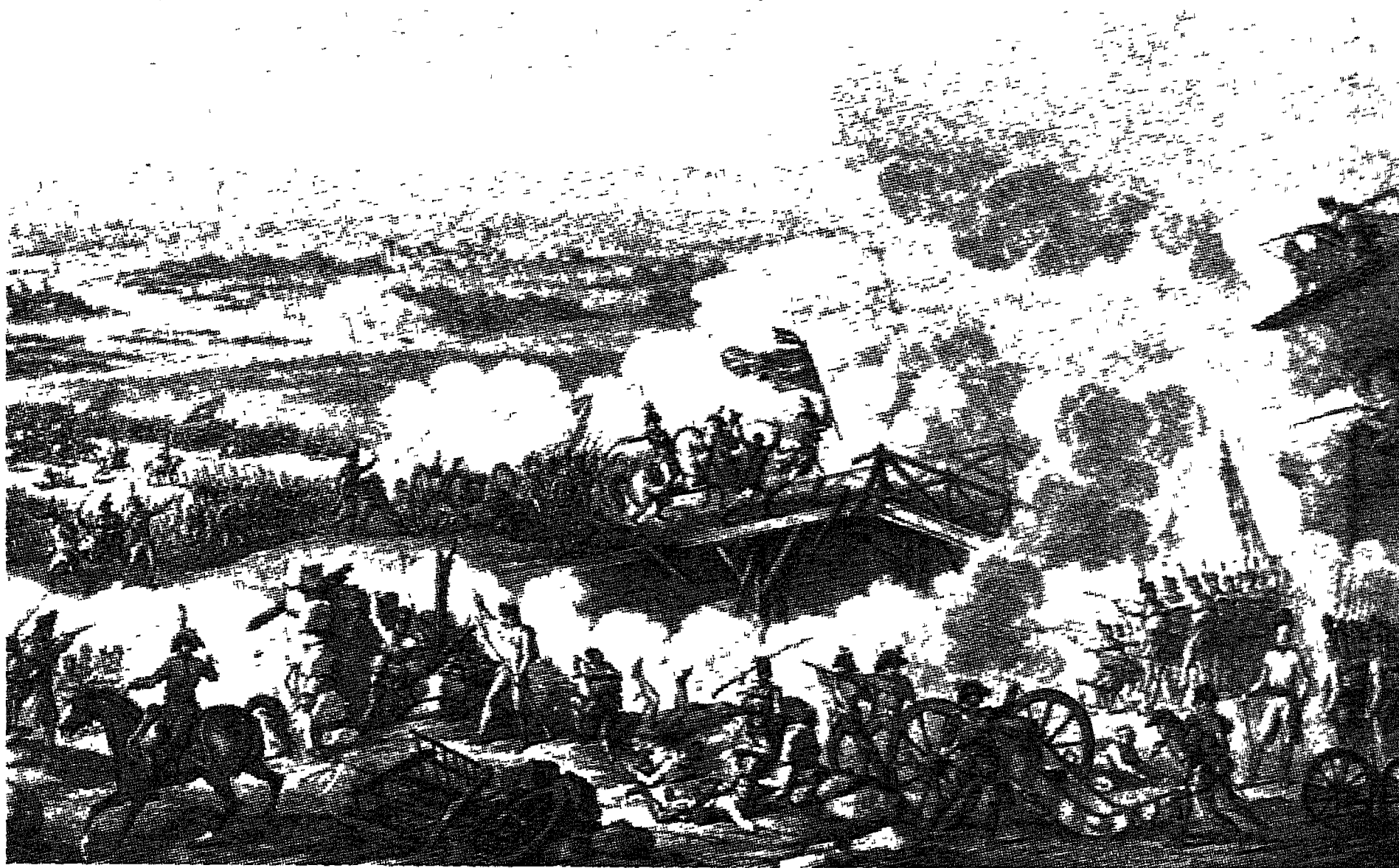
Arc Lamp. Carbon lamp used in a cinema projector

trians until dawn, and then had to beat a retreat, first lighting a fire, however, that burnt a third of the town; the allied forces then marched on Paris. Arcis-sur-Aube was much damaged in the Second Great War. Pop. (1954) 2,617.

**Arc Lamp.** Lamp in which the source of light is a luminous electric arc. Before the manufacture of incandescent filament lamps of high candle power, arc lamps were extensively used for street lighting. Later uses were for searchlights, cinema projectors, and spotlights in theatres (sometimes called limes), and in the treatment of disease.

**Arcola.** Small town of Italy in the province of Spezia. It lies close to the Gulf of Spezia, about 2½ m. S. of Vezzano, and is famous for its wines. Pop. (1951) 7,868.

The little town of Arcole (*v.i.*), in Verona prov., 16 m. E.S.E. of



Arcole. The fight at the bridge of Arcole, November 17, 1796, from an old engraving: Napoleon Bonaparte seized a standard and led his men in a charge through a hail of bullets, driving the Austrian defenders from the bridge

Verona city, is sometimes called Arcola. Pop. (1951) 4,150.

**Arcole, BATTLE OF.** Indecisive victory of Napoleon Bonaparte over the Austrians, Nov. 15-17, 1796. Arcole lies on the Alpone, a tributary of the Adige, about 16 m. E.S.E. of Verona. To relieve Mantua, besieged by the French, Alvinczy with a new Austrian army about 29,000 strong was sent into Italy. It was to unite at Verona with another army of 18,000 men, then in Tirol. Bonaparte had about 43,000, but some were stationed to check the advance, others to invest Mantua, and only about 18,000 were available for any new movement. On Nov. 14 Bonaparte, fearing the loss of Italy, crossed the Adige to work round the rear of Alvinczy's forces, and attacked before these could effect a junction with the other Austrian army. Two days passed in indecisive encounters, but in a new attack on the 17th the French drove the defenders of the bridge of Arcole across the Alpone and out of the town. The Austrians slowly gave ground and fell back to San Bonifacio.

**Arcos de la Frontera.** Town of Spain, in Cadiz province. It stands on a rocky bluff beside the Guadalete, 19 m. E. of Jerez. Occupying the site of an Iberian settlement and a Roman colony (Carisa), it was prominent in the

struggle against the Moors. Antiquities include a Gothic church and ruins of the citadel and ducal palace. Pop. (est.) 16,000. The rock on which it stands is pierced by numerous ancient cave-dwellings.

**Arcos Raid.** Police action taken May 12-15, 1927, against the firm of Arcos, Ltd., agents for trade with the U.S.S.R., at their offices in Moorgate, London. The raid was made by Scotland Yard on the orders of the Home secretary, Sir W. Joynson-Hicks ("Jix"), later Lord Brentford, ostensibly to search for a missing War office document. It was stated that papers were found connected with espionage and subversive propaganda, together with photostat apparatus and a few old rifles. The government declared that the U.S.S.R. had thereby contravened the terms of the trade agreement of 1921, which was cancelled May 24, 1927. Diplomatic relations were broken and were not resumed until 1929. A new commercial treaty was signed 1930.

**Arcot.** Two districts in Madras state, India. North Arcot lies inland, W. of Madras city, and South Arcot is a maritime district stretching S. to Tanjore and Trichinopoly. The two were ceded to the British with the Carnatic, of which they form part, in 1801.

North Arcot is mountainous in the W., but elsewhere generally

flat. Of its rivers, all of which dry up during the hot season, the largest is the Palar, on whose banks stand the towns of Arcot, capital of N. Arcot, and Vellore. Agriculture and weaving are the chief industries. Area 4,671 sq. m. Pop. (1951) 2,859,157.

South Arcot, mountainous in the W., is mainly a level plain drained by the Coleroon, Vellar, and other rivers, whose waters are drawn off by channels for irrigation. There are two ports, Cuddalore and Porto Novo; groundnuts are exported. The district is mainly pastoral and agricultural, indigo and rice, millets, and other cereals being the chief crops. Lignite is mined. Pondicherri, formerly French, lies within South Arcot. Area 4,205 sq. m. Pop. (1951) 2,776,767.

The town of Arcot, capital of N. Arcot district, and a military cantonment, stands on the Palar, 65 m. W.S.W. of Madras, on the rly. to Beypur. Formerly the capital of the Carnatic, it was taken by Clive in 1751 and in 1758 by the French, who lost it again in 1760. Haider Ali captured it in 1780, and it became British in 1801. It has a number of mosques and some notable tombs. Pop. (1951) 21,124.

**Arcot, SIEGE OF.** British victory over the French in India in 1751. The British commander,



Robert Clive, with 200 English troops and 300 sepoy, took possession of the fort of Arcot, just outside the city, which the defenders had abandoned on his approach. His object was to draw off the French from Trichinopoly, where they were closely besieging an English garrison, and he succeeded in doing this.

Clive entered the fort on Aug. 31, 1751, strengthened the dilapidated defences, gathered provisions, and sallied forth against the enemy. On Sept. 23 the French, with a large body of Indians, took up their quarters in the city, and laid siege to the fort. Clive had only 80 Europeans and 150 sepoy fit for duty, but, although the besiegers numbered some 10,000 and the walls surrounding the mile-circumference of the fort were ruinous, he kept the enemy out.

The final attack was made on Nov. 14, when elephants with iron plates on their foreheads were sent against the gates, but even this failed before the courage of Clive and his men, and the seven-weeks' siege was lifted.

The siege of Arcot established British prestige in S. India, where the French, previously regarded as the dominant military power, never regained their influence.

**Arctic, THE.** The North Polar, or Arctic, regions, usually considered as the areas poleward of the northern limit of tree growth, comprising an ice-covered tract of ocean completely girded by continental land. The Arctic ocean, area about 5,400,000 sq. m., covers a relatively small north polar basin, with a probable maximum depth of 2,950 fathoms, lying eccentric to the Pole with its greatest extent towards eastern Siberia and Alaska, surrounded by a wide continental shelf of less

than 100 fathoms on which lie many islands and groups of islands. The pack ice of the Arctic ocean is kept in continual motion by the waters which are always flowing toward the main outlet between Siberia and Greenland. Some of it remains in the polar basin, but it has been estimated that 26 billion cubic yards of sea ice are annually drifted to lower latitudes on the waters of the Arctic (see also Arctic Ocean).

The land areas of the Arctic almost enclose the ocean; treeless, they reach latitudes as low as 60° N. or as high as 71° N. and include north Greenland, Spitsbergen, and other islands of the Arctic ocean, the Canadian Arctic Archipelago, Alaska, and the coastal regions of Siberia and Europe as far west as the White Sea.

The distinctive feature of the Arctic is its periods of light and darkness. At the North Pole the sun is out of sight entirely for approximately 6 months while for an equal period it is constantly above the horizon; on the Arctic Circle the sun does not set at the summer solstice or rise at the winter solstice, giving 2 or 3 weeks of almost continuous day and continuous night at those times.

During the period of extended daylight the sun is never very high in the heavens and has little power; on the other hand, except

at times of heavy cloudiness, the darkness of the Arctic night does not approach the utter blackness of temperate or tropical midnight. Winters are bitterly cold and the ground, deeply frozen, thaws only to a depth of a few inches in the short cool summer. Precipitation is meagre—over large parts it is less than 10 ins.; it usually falls as snow. Fogs are of frequent occurrence.



The Arctic. Chukchi woman of Wrangel Island, in the N.E. of Asiatic Russia

The tundra vegetation is typically a dreary stretch of lichen and coarse grass, with dwarf willows, birches, and alders in sheltered hollows. Occasional sun-warmed southern slopes carry flowers, e.g. campion, rock rose, monkshood, thrift, forget-me-not. Except the ice-caps, no Arctic land is devoid of fauna. The numerous animals include the musk-ox, the caribou (reindeer), white Arctic hare, lemming, ermine, and Arctic wolf. The white

polar bear or ice bear is the most characteristic of all Arctic animals. Though an air breather, it is really a sea mammal and is seldom found far from sea-ice. Seals and walrus are other sea mammals. Cod, halibut, capela, and sea birds abound; land birds are rare.

Many peoples touch the Arctic regions towards the northern limits of their expansion, e.g. the Lapps and Samoyeds (or Nentsy) in Europe, the Ostyaks (or Khanty) of the Yenisei, the Tungus (or Evenky), Koryaks (or Nymylany), Yukaghir, and particularly the Chukchi in Asia. The Eskimo (or Innu) are the only people whose habitat is very nearly confined to the Arctic regions. All these peoples are fishers and hunters and lead a nomadic existence.

Frostbite and snow-blindness are maladies directly attributable to the climate; otherwise the Arctic regions are healthy. Scurvy was once a scourge owing to lack of fresh-food vitamins.

In 1954 the first regular trans-Arctic air service was opened by a Scandinavian airline; the route, from Los Angeles to Copenhagen, lay via Winnipeg and Blue West 8 (on the W. coast of Greenland). The same line intended in 1956 to begin a service from Scandinavia directly over the North Pole via Fairbanks, Alaska, to Tokyo.

**Arctic Circle.** Parallel of latitude 23½° from the North Pole, i.e. in lat. 66½° N. Since the earth's equatorial plane remains invariably inclined at 23½° to the orbital plane, this north polar cap is presented wholly to the sun in midsummer and turned wholly away in midwinter.



The Arctic. Samoyed fisherman making a net. Branches of the Samoyed people are to be found in all parts of Arctic Siberia

## ARCTIC EXPLORATION AND DISCOVERY

Admiral Lord Mountevans, K.C.B., D.S.O.

*This narrative describes the various expeditions that have gone out to discover the North Pole and to lands around it. See further the articles on those lands and those on the several explorers, Amundsen, Franklin, Nansen, Peary, and others*

The exploration of the North Polar region has been actuated by two motives, the need for new trade routes or new trade commodities and a spirit of geographical inquiry which drove men towards the Pole itself. These two motives have been frequently combined, but, in general, the early explorations resulted from a trading search for either a N.W. or a N.E. passage to China, and the later journeys were scientific in aim. The early desire to achieve a voyage to the Far East by the Arctic Ocean awoke during the period of the great discoveries, and was akin to the spirit which prompted Columbus, Vasco da Gama, and Magellan; the later scientific expeditions aimed at investigating the magnetic, climatic, and oceanographic conditions which prevail in the frozen North.

### Story of the North-West Passage

John Cabot began the search for a N.W. passage to the Indies in 1497; he discovered Newfoundland and in 1498 his son Sebastian reached 67° 30' N. Corte-Real, Verrazzano, and Gomez, in the period 1500-24, followed the Cabots, but did little more than inaugurate the lucrative Newfoundland fisheries. Frobisher in 1576 discovered the straits now named Frobisher and Hudson. John Davis made three voyages, achieved a farthest north at 72° 41' N., and explored long stretches of the coasts of Greenland and Labrador. Sanderson's Hope on the map indicates the headland which was his turning-point, and the name was abbreviated from the full title: "Sanderson His Hope of a North West Passage to India." Henry Hudson explored the east side of Hudson Bay and was left to his fate by mutineers after a winter in the ice of James Bay, 1610-11. Baffin attained on July 5, 1616, the lat. 77° 45' N., which was a record in that area for 236 years; he discovered Baffin Bay, Ellesmere Island, and Prudhoe Land. John Ross confirmed Baffin's discoveries in 1818 and penetrated Lancaster Sound for 50 miles. Parry in 1819 traversed Lancaster Sound and reached 114° W in 1820 among the Parry Islands, after spending the winter on Melville Island, and by so doing earned a reward of £5,000 offered by the British Government to the explorer who first went westward beyond 110° W. Other

explorers penetrated among the islands north of Canada, and in 1831 James Clark Ross located the North Magnetic Pole in Boothia Peninsula in 70° 5' N. and 96° 44' W. In 1845 Sir John Franklin with the ships *Erebus* and *Terror*, which had just returned from the Antarctic, led a well-equipped and very promising attempt to sail west from Lancaster Sound; he was last seen near the opening of Lancaster Sound. His failure to return as planned in 1847 stimulated both official and private persons to make vigorous efforts for his relief or to solve the problem of his disappearance.

The search for Franklin marks an epoch in the story of the N.W. Passage, but during the three centuries and a half between 1497 and 1848 other Arctic journeys had been made, most of which had some effect in producing the great outburst of activity in the years which followed 1848. James Cook in 1778 had sailed along the Asiatic and American shores east and west of Bering Strait, in an area where Russians had previously made explorations; in 1816 Kotzebue and in 1826 Beechey reached Kotzebue Sound. The fur trade, inaugurated in 1670 by the establishment of the Hudson Bay Company, led to overland journeys all aimed at discovering the North-West Passage. The mouth of the Coppermine was reached in 1771 by Hearne; and Mackenzie reached the mouth of the river which bears his name in 1789. In 1820 Sir John Franklin made great journeys by sledge and canoe in this region and discovered Point Turnagain; Back reached the Great Fish river in 1833; Dease and Simpson made further journeys in 1838-9; and Rae in 1845-7 completed the exploration of the Hudson Bay region.

### Discovery of Franklin Relics

All these travellers had made the N. of Canada sufficiently familiar for land journeys in search of Franklin to be undertaken with some hope of success. Rae in 1848-54 traversed large areas and obtained from the Eskimos Franklin relics and an account of the death of 40 white men. Anderson in 1855, Hall in 1860-2, Schwatza and Gilder in 1878-9, continued Rae's work.

Search was also made by sea in Lancaster Sound, Hudson Bay, and Bering Strait; on one such voyage

McClintock in the *Fox* was beset by the ice in Melville Bay and drifted about 1,200 m. before he was free. From a voyage 1857-59 he brought back a written memorandum on the fate of Franklin: he had died in June, 1847, and the ships had been deserted in the following April after being fast in the ice for eighteen months. Meanwhile McClure in the *Investigator* in 1850-3 reached Banks Island, which had been discovered by Parry, and demonstrated that there was a continuous N.W. passage by sea north of Canada; Collinson in the *Enterprise* during the same period made a similar voyage and obtained Franklin relics.

The cumulative result of all the discoveries showed that most of the members of the Franklin expedition had perished in an attempt to reach safety by a land journey for which they were ill-equipped, and demonstrated that Franklin had penetrated sufficiently far west to reach water navigable to the Pacific. The N.W. passage had been discovered, but it was not until Roald Amundsen navigated the *Gjøa* from sea to sea in 1903-5 that a ship made the complete voyage.

### Trading Voyages to the Yenisei

The first efforts to make the N.E. passage led to Novaya Zemlya. Willoughby and Chancellor in 1553, Burrough in 1556, Pet and Jackman in 1580 led the way for Barents, who made important discoveries in 1594-6. The Muscovy Company and the Amsterdam merchants profited by these discoveries to open up trade with Russia. Russian fur hunters gradually pushed their way along the coasts, the most notable being Deschnef, who sailed through Bering Strait to Kamchatka in 1648. Details of the coast were more fully explored during the period 1733-42 by the Russians Muravieff, Pronchistshef, Laptieff, etc. Nordenskiöld, after gaining experience in many expeditions during the years 1858-72, proceeded in 1875 to the Yenisei and returned overland, and repeated the journey in 1876; since then many trading voyages to the Yenisei have been successfully accomplished. In 1878 Nordenskiöld took the *Vega* within 120 m. of Bering Strait in one season, wintered off the coast at 123° E., and completed the voyage to the Pacific in 1879.

Whalers went to Spitsbergen, where it became a custom to pass the winter in time to be ready for work in the early spring. Pelham in 1630 was the first to do this. Henry Hudson had explored parts of the island in 1607; Norden-skiöld, Leigh Smith, and many



others continued the explorations. The records "farthest north" attained in this area were Barents, 1594, 77° 20', near Novaya Zemlya; Hudson, 1607, 80° 23'. Whalers had habitually fished the waters of Davis Strait and the ocean E. of Greenland for nearly 250 years; the most notable of these was Scoresby, who followed much of the coast of East Greenland, and reached, in 1806, 81° 30' N., which was a record for this part of the Arctic.

#### The British Nares Expedition

The 19th century saw many attempts to reach the Pole, which were chiefly made from the Spitsbergen area on the east and by Smith Sound north of Baffin Bay on the west. Parry sailed in the *Hecla* in 1827 and reached 82° 45' N., north of Spitsbergen, on a sledge journey which kept him 61 days away from the ship. Kane left New York in 1853 in the *Advance* with the intention of using Eskimo help in a journey to explore N.W. Greenland; he spent two winters in the Arctic, passed through Kane Basin into Kennedy Channel, and reached 80° 10' N., a record for that region. Hayes in the United States followed up these voyages and added to men's knowledge of Ellesmere Land. In 1871 the *Polaris* in the Hall expedition had the good luck to sail through Kane Basin, Kennedy Channel, Hall Basin, and Robeson Channel into the Polar Sea and to achieve the record for a ship of 82° 11' N. This success led to the British Nares expedition of 1875; with great difficulty the ships were taken through the unfavourable ice conditions and the *Discovery* wintered in Discovery Harbour and the *Alert* wintered at Floeberg Beach, 82° 24' N., and established a new record; sledge journeys were undertaken and Aldrich beat Parry's furthest by attaining 82° 48' N., and A. H. Markham the next year reached 83° 20' N.; coast lands were explored and valuable observations made concerning geology, natural history, meteorology, and tidal conditions. The sledge journeys were carried out under very great hardships.

Meanwhile Swedish expeditions had been at work north of Spitsbergen; von Otter took the *Sofia* to 81° 42' N. in 1868, and Nordenskiöld tried to reach the Pole by reindeer sledging in 1872. In this year Weyprecht and Payer started on an Austrian expedition with the *Tegetthof*, discovered Franz Josef Land, and reached in 1874 Cape Fligely, 81° 51' N., the nearest known land to the Pole;

Leigh Smith in the *Eira* explored much of this archipelago in 1880-1. In 1894 Alfred Harmsworth patriotically sent Jackson in the *Windward* to explore this area thoroughly; he returned in 1897.

From 1770 to 1820 Russians had explored the islands north of Siberia, and Wrangel's companion Aujou reached 76° 36' N. in 1823 and failed to discover the large area of land which was believed to exist in that region. This belief was held until 1881, when De Long's ship, the *Jeannette*, made a great drift across the Arctic Ocean from north of Wrangel Island to N.W. of De Long Islands.

Scientific work in the Arctic received a great impetus by the establishment in 1881-3 of the international circumpolar stations set out below:

Lat. N.	Long.	Country	Leader
81° 44'	64° 45' W.	U.S.A.	Greely
78° 28'	16° E.	Sweden	Ekholm
73° 23'	124° E.	Russia	Jurgens
72° 23'	52° 44' E.	Russia	Andejeff
71° 16'	158° 40' W.	U.S.A.	Ray
71° 0'	64° E.	Denmark	Hovgaard
70° 0'	8° 28' E.	Austria-Hungary	Wohlgemuth
69° 56'	23° E.	Norway	Steen
67° 24'	26° 36' E.	Finland	Lemstrom
66° 36'	67° 19' W.	Germany	Giese
64° 11'	51° 40' W.	Denmark	Paulsen
62° 39'	115° 44' W.	Britain and Canada	Dawson

The importance of the scheme lay in the attempt to make throughout a whole year systematic and simultaneous observations by trained scientists at as many spots as possible on the edge of the unknown Polar Sea.

#### Nansen's Famous Voyage

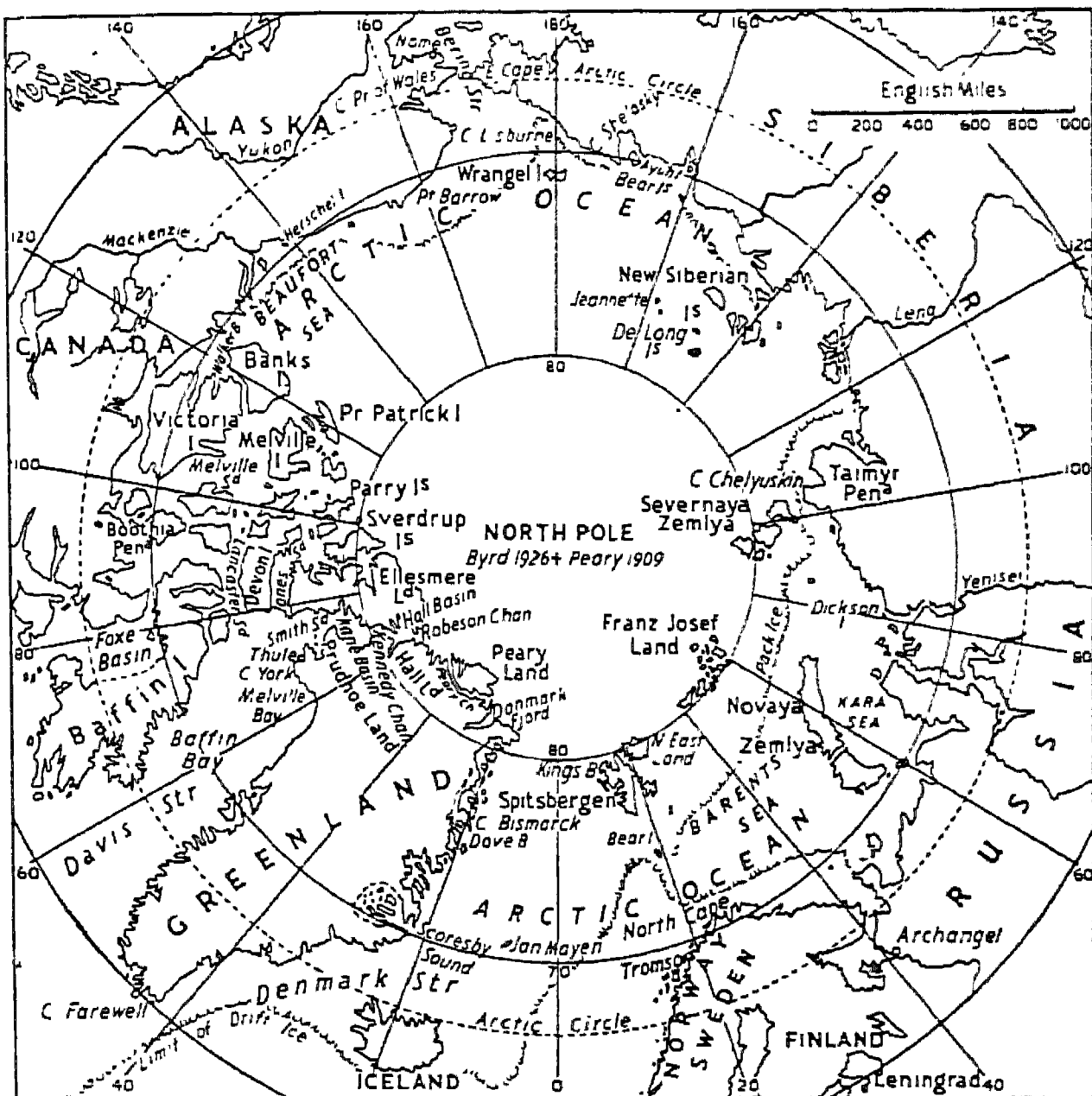
The most notable of these expeditions was that of Greely. Lockwood, his second in command, explored the Greenland coast and discovered Lockwood Island in 83° 24' N., and set up a new record for nearest the Pole; and both Lockwood and Greely made land journeys and explored some 6,000 sq. m. of newly discovered land.

In 1893-6 Nansen, who had previously, in 1888, accomplished the first crossing of the Greenland ice-cap from E. to W., made one of the most famous of polar voyages. He had a specially constructed ship, the *Fram*, and set out deliberately to have his ship beset by the ice in order to drift over the Arctic Ocean in the fashion of the *Jeannette* and, if luck favoured him, to float over the Pole. Frozen in about 79° N., the *Fram* drifted with the ice. Nansen and Johansen attempted a dash for the Pole over

the ice; they reached 86° 14' N. and were picked up in 1896 by Jackson in Franz Josef Land. The *Fram*, under Sverdrup, drifted on, gained 85° 57' N., rounded the N.E. of Spitsbergen, and safely reached Norway. In 1899 Sverdrup took the *Fram* west of Greenland and explored Jones Sound. In the same year the duke of the Abruzzi's expedition sailed for Franz Josef Land, and Cagni reached 86° 34' N. by sledge in 1901. In 1897 a most risky attempt to gain the Pole by balloon was made by Andrée from Spitsbergen; no trace of this abortive attempt, beyond three message buoys dropped on the first day of the journey, was found until 1930 when the remains of Andrée and his two fellow aeronauts were discovered at White Island near Franz Josef Land.

Robert E. Peary was the most persistent of the Arctic explorers. He commenced operations in 1886 by a journey on the Greenland ice-cap; in 1891-2 and 1893-6 he made journeys across N. Greenland; in 1898-1902 he explored Ellesmere Land, rounded the N. end of Greenland, reached 84° 17' N. These land journeys familiarised him with the Eskimos and ice conditions. He wintered his ship, the *Roosevelt*, in the Arctic Ocean in 1905, and gained 87° 6' N. He acquired valuable experience of the ice on the open ocean and established a record by bringing the *Roosevelt* safely home. In 1908 he took the *Roosevelt* to the earlier winter quarters, organized a thorough series of relay expeditions, gained the Pole on April 6, 1909, and found no land in sight and a deep sea below the ice-crust.

While Peary had been making his repeated attacks on the N. Pole, the Mylius-Erichsen expedition, greatest of all Danish Arctic ventures, explored Melville Bay and wintered at Cape York. Leaving Copenhagen in the sealer *Denmark* in June, 1906, with a strong scientific staff, Mylius-



Arctic Exploration. Map of the north polar regions, showing their relation to adjacent continents. The arctic circle is marked by a dotted line

Erichsen led an inspired company to explore and observe a great part of unknown Greenland. Using over 100 sledge dogs, this expedition gave to the world a great store of scientific and geographical knowledge, but it suffered the loss of its leader and two companions through relying on the erroneous map of earlier explorers. Mylius-Erichsen was, through shortage of food, compelled to part company from his supporting sledge-party under Lieut. J. P. Koch, and sailed away, never to be seen again.

Koch's complete sledge journey was one of the finest ever made in the Arctic—1,400 m. in 88 days, 570 m. over undiscovered country. To the Mylius-Erichsen expedition we owe the credit of discovering and charting all the land beyond Bourbon Is., 130 m. N. of Cape Bismarck. The scientific results of this journey were of great value and interest, chief of which was completing the main outline of Greenland, and proving finally that it was an island. Many fossils were found amongst the collections made. On this expedition nearly 200 sledge and boat journeys were made.

Capt. Mikklesen, who in 1908 conducted a search for the relics of the dead explorers, brought home records that disproved the existence of the Peary Channel.

To Mikklesen, and his companion Iversen, may be attributed one of the most Homeric of Arctic journeys—600 m. with insufficient food, with first the leader suffering badly from scurvy, and then his companion falling a victim to the disease. Mikklesen and Iversen were alone for twenty-eight months out of the three years spent by their expedition in Greenland; their story was a most remarkable tale of heroism and sacrifice. Mikklesen made the first crossing of the inland ice-cap between Dove Bay and Danmark Fjord.

#### Exploration of Greenland

Greenland's glacial plateau has received great attention in recent years. Nansen's crossing of S. Greenland in 1888 and Peary's in the N. in 1892 were followed by more difficult and hazardous crossings by Rasmussen, 1912. The Swiss scientist, De Quervain, 1912, Koch, 1913, Rasmussen, 1916, Hoygaard, Rymill, and Scott, with various companions; all helped to prove that inland meteorological and magnetic stations at high altitudes could if necessary be established and maintained throughout the year in the Arctic, just as Antarctic explorers had proved this possibility in the cruel, white South. This Greenland plateau is a million sq. m. in area, or about five times the size of France, and as

high as 9,000 ft. A journey from N. to S. is about the same distance as from Copenhagen to the Sahara.

Russia has sent many expeditions into the Arctic-Siberian sector. Capt. Vilkitsky, with ice-breakers, attempting the N.E. passage, found islands in the new Siberian group, and in 1913 discovered extensive land, which he named Severnaya Zemlya or Northland, running in a S.E. to N.W. direction up to the 80° parallel and beyond. Vilkitsky was second to Nordenskjöld in making the N.E. passage from W. to E., but first to make it from E. to W.

Roald Amundsen, first to reach the S. Pole, resumed his Arctic explorations in the summer of 1918, when, sailing from Tromsø in his specially constructed ship *Maud*, and taking the N.E. passage as the shortest route from Norway, he passed Cape Chelyuskin and fixed its position on Sept. 9 as the most N. point of Asia, in 77° 44' N., 104° 17' E. The *Maud* wintered in the lee of two small islands, the only shelter available. Amundsen was nearly killed by a bear, and nearly suffocated by a stove later on. His heart was affected, and his lacerated arm troubled him until he obtained surgical aid three years later. The *Maud* broke free on Sept. 12, 1919, when two of her crew left to bring letters and news to Norway, a hazardous business in which they both perished. She made poor progress eastward in 1919, and after passing S. of the new Siberian Islands was forced to winter a second time at Ayun Island near Cape Shelasky. In Aug., 1920, she reached Nome in Alaska; four other men returned home, leaving Amundsen with only three companions to work the ship when he sailed for his projected drift across the Polar sea. All went well until the propeller broke near East Cape, when Amundsen was compelled to winter a third time at Cape Serolekamen. In the spring of 1921, five natives helped to sail the *Maud* to Seattle. Amundsen then turned to flying.

In June, 1922, however, he sailed in the *Maud* from Seattle, with provisions for seven years; but with unfavourable ice conditions at the beginning of the voyage, he handed over command of his expedition to Capt. Wisting, who conducted the Polar Drift. The *Maud* spent next winter in heavy pack, drifting steadily towards N.W., and reaching 74° N. and 170° E. by March 10. In June lat. 75° 30' was reached, and for another two months her track



nearly coincided with that of the *Jeannette* in 1879-80. After passing another winter S. of De Long Islands, she received in Feb., 1924, a message to abandon the voyage. Unfortunately the ship was again caught in the ice near the Bear Islands, and did not end her long voyage until Aug. 22, 1925. Sverdrup, who accompanied this expedition, contributed largely to the scientific results. Wisting failed to take advantage of the drift existing from N. of Bering Strait to the N.W. across the Arctic Basin.

In 1932 the Russian explorer Schmidt became the fourth man to make the N.E. passage—in the ice-breaker *Sibiriakow*—in the record time of nine weeks. From 1936 onwards, following Schmidt's further exploration in the ice-breaker *Chelyushkin*, new Russian commercial routes, internal and external, were opened up.

That modern Viking Amundsen, in May, 1925, made a flight to lat.  $87^{\circ} 43' N.$  With Riiser-Larsen as pilot, he flew with two Dornier flying boats from W. Spitsbergen. Lincoln Ellsworth joined him on May 23, after Amundsen had been compelled to come down in an open water lead since half his fuel had been expended. It was a hazardous business for lightly constructed seaplanes to descend among the ice floes, and one machine was wrecked. The two crews, six men in all, lived in the cabin of the undamaged machine until June 15, when, abandoning everything but the barest necessities, they returned. Amundsen reached the N. Cape, and his party was rescued thence by a Norwegian cutter.

#### Polar Flights

On May 9, 1926, the U.S. explorer Byrd took off from King's Bay, Spitsbergen, flew to the Pole, encircled it, and returned to his base—all in 15 hours. Two days later Amundsen set out in the airship *Norge*, piloted by the Italian Nobile; they crossed the Pole, and landed in Alaska May 14.

Polar flights now became almost fashionable. Nobile, promoted general, took the dirigible airship *Italia* to the N. Pole in 1928, but she was wrecked over the pack ice. Six of her crew were killed, and Nobile himself injured. The valiant Amundsen, who took part in the search, lost his life when his Dornier came down in the sea.

Exploration by air having revolutionised Polar travelling, the names of some of the greatest Arctic explorers, like Rasmussen and Stefansson, are apt to fade

into the background of public memory, but to Rasmussen must be attributed the founding of the most northerly settlement in the world. It is on North Star Bay, in the N.W. part of Greenland, lat.  $77^{\circ} N.$  Rasmussen named it Thule. In his extensive sledge trips he found undulations similar to those on the Antarctic plateau, and used both igloos and tents in travelling with his dog teams, who for five or six days on end could average nearly 50 m. a day.

#### Students' Expeditions

The British did nothing in the Arctic for many years. Then in 1921 George Binney and young men from Oxford and Cambridge inaugurated a new school of British explorers, splendid types like Gino Watkins and Wordie—often classical scholars rather than scientists. They chartered little motor vessels and fearlessly faced the hazards and hardships of the North. Often they took to the air, sometimes they used motor boats, or even kayaks.

Germany has taken a small part in Arctic research. In July, 1930, Wagener established a plateau station, 240 m. E. of Kamarujuk, midway between the E. and W. coasts of Greenland, at a height of 9,700 ft. He lost his life attempting to reach the E. coast, where a station had been set up in Scoresby Sound. The expedition returned to Copenhagen in Nov., 1931.

The Arctic cruise of the German airship *Graf Zeppelin*, commanded by Hugo Eckener, was undertaken at the end of July, 1931, for geographical and scientific purposes. The airship passed over Severnaya Zemlya group of islands and the Taimyr Peninsula, Dickson Island, and near Sverdrup Island, thence along Novaya Zemlya and back to Russia via Archangel. The air view of the Arctic, now for the first time properly photographed, revealed much that was unknown.

In 1928 Sir Hubert Wilkins, who served his Arctic apprenticeship with Stefansson, one of the greatest authorities on the Eskimos, and one of the greatest of Arctic travellers, made his famous flight across the Arctic regions from Point Barrow to Spitsbergen.

In May, 1937, a party of scientists led by Schmidt landed 15 m. from the N. Pole and stayed there until the ice floe on which they had camped drifted southwards. They were taken off by an ice-breaker in 1938.

The 80-ton motor patrol vessel of the Royal Canadian Mounted Police, *St. Roach*, completed the

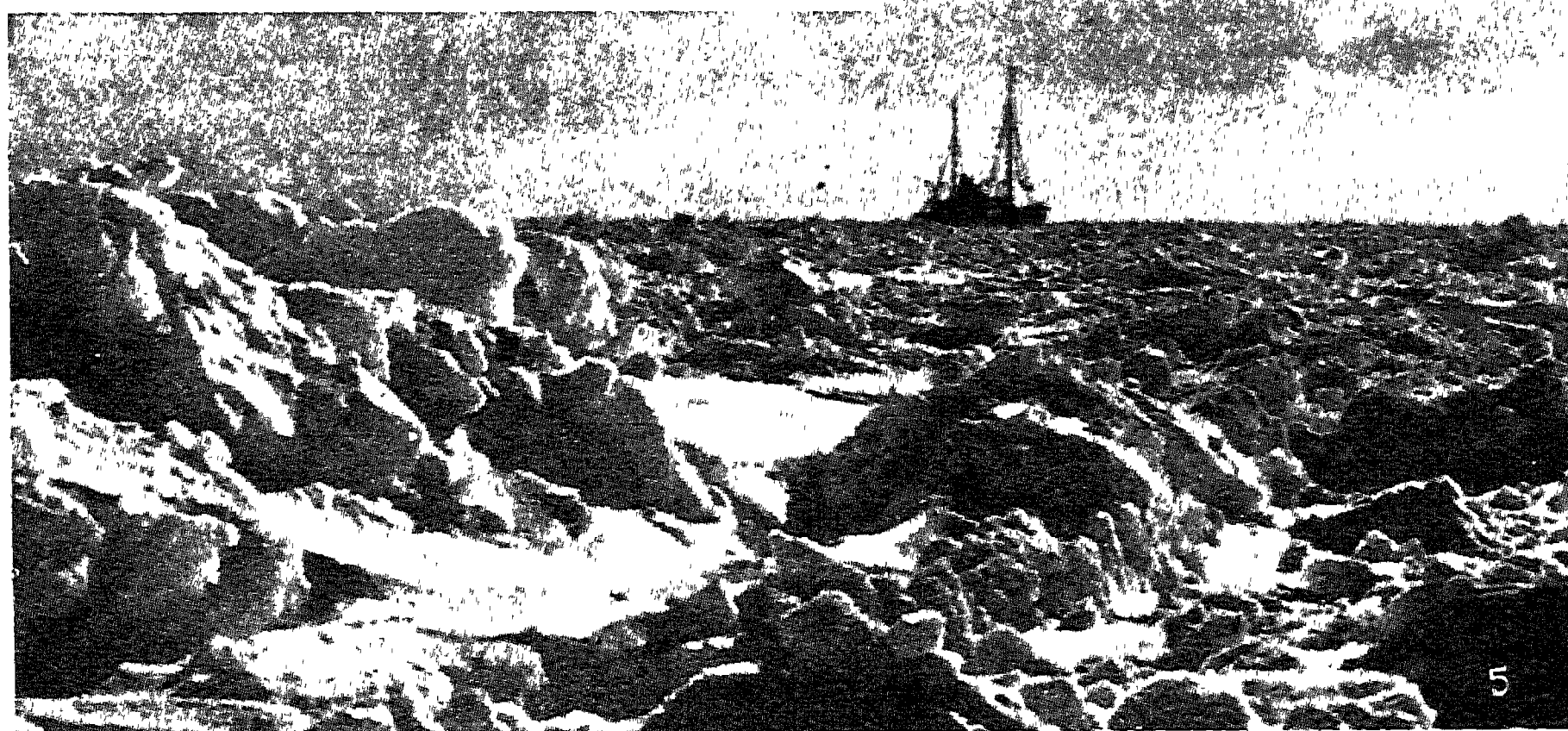
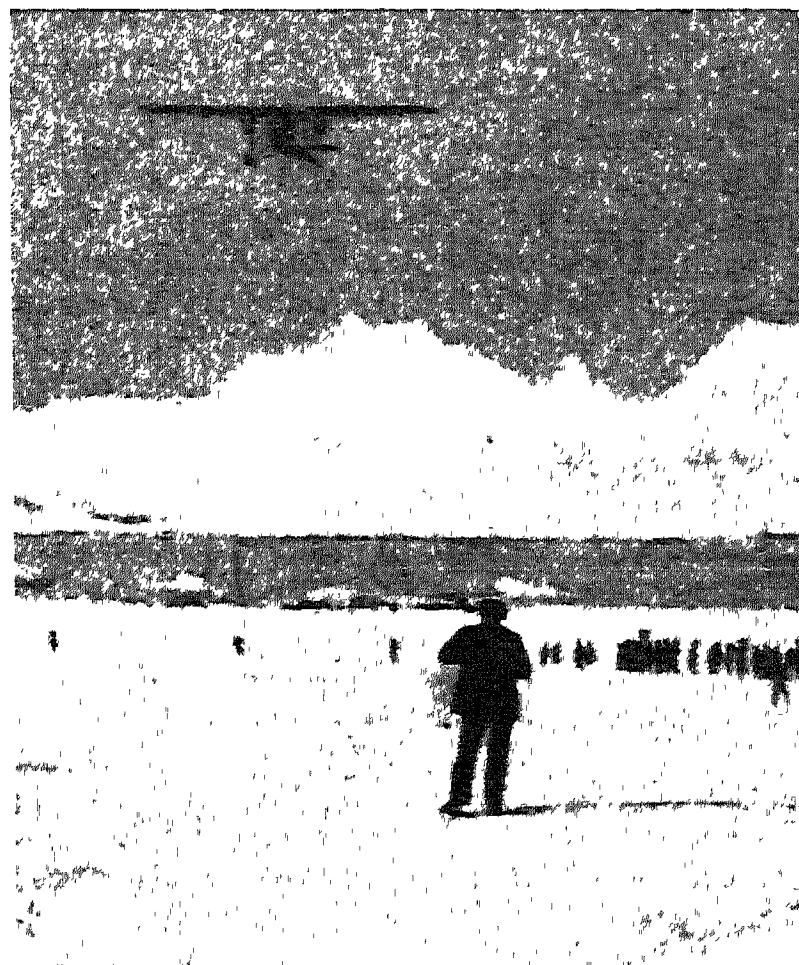
N.W. passage from W. to E. in 1942, under Sgt. H. A. Larsen, a naturalised Canadian born in Norway. The expedition left Vancouver June 21, 1940, and reached Point Barrow on July 22; thence the *St. Roach* voyaged via Herschel Island, Cambridge Bay, and Walker Bay. Wintering at Victoria Island, she voyaged on in July, 1941, and spent a second winter at Pasley Bay. Finally the vessel worked and drifted through the ice and made the Hudson's Bay Company post at Fort Ross, which she left Sept. 2, 1942, to reach Battle Harbour Sept. 22: an epic achievement for such a lightly constructed vessel.

#### Over the Magnetic Pole

On May 10, 1945, a notable flight in Arctic regions was undertaken by the R.A.F. in a Lancaster aircraft, *Aries*, with the object of flying over the N. and the N. Magnetic Poles. The expedition was captained by Wing-Comdr. McKinley, with Wing-Comdr. McClure, R.C.A.F., as senior observer.

They flew from Reykjavik direct to the N. Pole and back; thence to Goose Bay in Labrador, from which course was laid to the Magnetic Pole, which was located in approximately  $76^{\circ} N., 101^{\circ} W.$  Then from Whitehorse, Yukon, a non-stop flight of more than 4,000 m. was made across the N. Magnetic Pole again, and then right across Greenland and the N.E. coast of Iceland. The expedition's aims were to study air crew efficiency and navigational problems peculiar to polar flying; to examine the behaviour of compasses, radar installations, and automatic dead-reckoning gear; to collect meteorological information; and to study topography in the region of the Magnetic Pole. About 2,000 photographs were taken. This was the first time the Magnetic Pole was flown over. Its position was reported to be about 250 m. N.W. of its last presumed position, an observation confirmed in 1946.

*Bibliography.* The First Crossing of Greenland, F. Nansen, trans. H. M. Gepp, 1890; Farther North than Nansen, Duke of the Abruzzi, 1901; Nearest the Pole, R. E. Peary, 1907; Handbook of Polar Discoveries, A. W. Greely, 1910; The North Pole, R. E. Peary, 1910; The Call of the North, H. Houber, 1932; The Conquest of the North Pole, Rev. G. Hayes, new ed., 1937; War Below Zero, B. Balchen, C. Ford, and O. La Farge, 1945; The Polar Record, ed. F. Debenham, issued annually.



1. Stars and Stripes flying over the North Pole, marking the triumph of Peary, who, in 1909, was the first explorer to reach it. 2. Peary's expedition on the march. 3. Ice floes of the Kara Sea photographed from the Graf Zeppelin in July, 1931. 4. In May, 1926,

Byrd flew over the North Pole, with Floyd Bennett as pilot; here is seen their Fokker monoplane starting from Spitsbergen. 5. Rescue ship Braganza caught in the ice floes during her search for Nobile after his ill-fated flight to the Pole in the dirigible airship Italia in 1928

# ARCTIC EXPLORATION: DESOLATE REGIONS WHICH HAVE BEEN CONQUERED BY MAN

*Photos 1 and 2, from The North Pole, by R. E. Peary, by permission of Messrs. Hodder & Stoughton*



**Arctic Ocean.** Term applied generally to the waters N. of Europe, Asia, and America. These include the Greenland and Norwegian Seas between Greenland and Norway, the Barents Sea N. of Europe, the White Sea, the Kara Sea between Novaya Zemlya and Yamal Peninsula, and the Beaufort Sea N. of Alaska. It communicates with the Atlantic by Davis Strait, Denmark Strait, and the sea between Iceland and Norway. Its only connexion with the Pacific is by Bering Strait.

It is the best defined and smallest of all the oceans, but, except as regards the Greenland, Barents, and White Seas, is inadequately explored. The polar basin as far as is known has a maximum depth of 2,950 fathoms, which occurs on the Asiatic side of the North Pole; near the pole itself Peary failed to reach bottom with 1,500 fathoms of line. The floor rises steeply to a broad continental shelf with depths of less than 200 fathoms, and often less than 100 fathoms. On this broad shelf lie Spitsbergen, Franz Josef Land, Novaya Zemlya, Severnaya, Zernlia, the New Siberia Islands, Wrangel Island, and the Canadian Arctic Archipelago. The Greenland Sea forms a second deep basin, cut off from the polar basin by a submarine ridge in about lat. 80° N. and from the North Atlantic by the Faroe-Icelandic ridge in about 300 fathoms. Baffin Bay and Davis Strait form a third basin, which is seldom over 300 fathoms in depth and is cut off from the polar basin by ridges within 50 to 100 fathoms below the surface. Bering Strait is about 30 fathoms deep.

The bottom deposits of the Arctic Ocean are mainly of terrigenous origin derived from numerous large rivers, the Pechora in Europe, the Ob, Yenisei, Lena, and Kolyma in Asia, and the Mackenzie in America. The salinity of the surface waters is low. Surface temperature has an annual range of only a few degrees, and is generally about 29° F., except in the eastern part of the Greenland Sea and in the Barents Sea, which are influenced by a branch of the warm North Atlantic drift. These two seas are the only parts of the ocean which are not blocked by ice in winter. About three-quarters of the inner polar basin remains permanently frozen, but navigation is possible in the summer months in the Greenland, Barents, and White Seas, along the N. coasts of Europe, Asia, and

Alaska and in Davis Strait and Baffin Bay. The U.S.S.R. has developed the navigation of the N.E. passage by using ice-breakers, aeroplanes, and radio ice and weather reports. The chief current besides the branch of the North Atlantic drift already mentioned seems to be a general drift across the pole from eastern Asia to Spitsbergen and Greenland. It was this drift that the Fram used in 1893-6, as did the Soviet North Pole expedition of 1937. Circular currents occur in the Greenland Sea. Cold currents pass down the E. and W. coasts of Greenland, carrying ice southwards, which is often a menace on the Atlantic trade routes. There is also a cold current of less importance through Bering Strait to the Pacific. The configuration of the floor of the Arctic Ocean prevents the deeper waters from reaching the Atlantic and Pacific Oceans. Animal life includes bowhead and finner whales, various seals, many kinds of fish, and a rich invertebrate fauna. Diatoms are often abundant enough to colour the surface waters green.

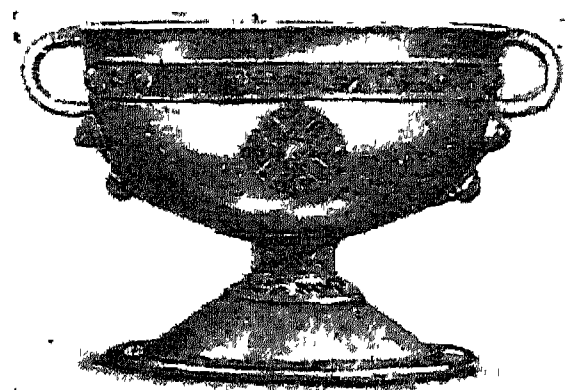
**Arcturus** OR ALPHA BOÖTIS (Gr. *arktos*, bear; *ouros*, guard). Principal star in the constellation of Boötes, the Herdsman, and third brightest star in the northern sky. It has a very large proper motion, which in the space of 800 years carries it across a space in the sky equal to the apparent diameter of the moon. Yet it has a small parallax, and is therefore very distant, so that its speed of movement has been estimated at 84 m. a second, and its light is about a hundred times that of the sun. It is easily found, apart from its brightness. Starting from the pole star, the last star in the handle of the Plough leads straight to Arcturus.

**Arcueil.** Town of France, in the department of Seine. It derives its name from Arcus Julianus, a Roman aqueduct. Waterworks in connexion with the supply of Paris were constructed here during 1613-24, and in 1868. In the 16th century Arcueil was a country resort, but the spread of Paris has made it virtually a suburb of that city. Pop. (1954) 18,067.

**Arculf** (fl. c. 680). Frankish bishop. One of the earliest Christian travellers after the rise of Islam, he visited the Near East about 680, and later told his experiences to Adamnan, abbot of Iona in the Hebrides, from whose account the story was continued by Bede in his Ecclesiastical History.

**Ardabil.** Town of Persia. It lies near the Caspian Sea and the Russian frontier, 110 m. E. of Tabriz, and at the foot of Mt. Savalan. An ancient city, it was an early capital of the Safavid dynasty, the founder of which, Ismail I (1480-1524), is buried here. His tomb and that of Sheikh Sefiuddin, a 14th-century religious leader, make Ardabil a place of pilgrimage. It is also noted for its hot mineral springs.

The town has an airfield and trades in grain and dried fruit. Pop. (est.) 86,000.



Ardagh. Richly decorated chalice of 8th- or 9th-century Celtic work  
Dublin Museum

**Ardagh.** Village of co. Limerick, Irish Republic, 4 m. N. of Newcastle. A unique silver chalice of Celtic craftsmanship, decorated with gold, enamel, and amber, and inscribed with the names of the Apostles, was discovered here in 1868. It is 7 ins. high, 9½ ins. across, and includes 20½ oz. of silver. It is dated to the 8th or the 9th century.

**Ardal** OR AARDAL. Town of W. Norway, in Sogn and Fjordane co., at the head of a branch of Sogn fiord. Here a powerful waterfall is harnessed to provide hydro-electricity (800 million kWh p.a.) for the large state-owned aluminium and pig iron works at Øvre Årdal. Pop. (1950) 3,764.

**Ardalan** OR ARDILAN. Name long borne by the Persian part of Kurdistan. It ceased to be an administrative division in 1938.

**Ardashir** OR ARTAXERXES. Name of three Persian kings of the Sassanid dynasty (A.D. 226-651). The first, the founder of the dynasty and regenerator of the empire, reigned from 226 to 241. He encouraged his countrymen to revolt against the Arsacidae (Parthians), to whom Persia was then subject, and by a decisive victory restored his country's independence. During his reign there were conflicts with the Romans under Alexander Severus. Ardashir was a devout Zoroastrian, and the first Persian ruler to assume the title of King of Kings. Ardashir II and Ardashir III reigned from 379 to 383 and from 628 to 630 respectively.

**Ardeatine Caves.** These caves on the Appian Way near Rome, long used as a dumping place for city refuse, were the scene on March 23, 1944, of a massacre by German troops of 335 Italians in reprisal for the killing by a bomb of 32 German S.S. men in Rome. The victims were indiscriminately picked from the city streets and prisons, marched to the caves, and shot. Mines were exploded and the caves collapsed. Von Mackensen and Mälzer, the two German generals responsible, and Kesselring, the German c.-in-c. who issued the order, were sentenced to death by a British military court in 1946, a sentence commuted to life imprisonment in 1947. Mälzer died in Werl prison March 24, 1952; von Mackensen and Kesselring were released in Oct., 1952. A huge sepulchral stone was erected here in 1949 as a memorial to the victims.

**Ardèche.** Dept. of S.E. France. Bounded E. by the Rhône, and named after its tributary the Ardèche, the dept. is watered also by the Loire, the Allier, the Ouvèze, and the Chassezac. Its capital is Privas. Ardèche is in the Cévennes region; its wonderful scenery includes the Bois de Païolive, a chaos of huge, tumbled rocks in fantastic groups amidst oaks; and the deep channel of the Ardèche across which stretches the Pont d'Arc, a natural arch.

Ardèche produces cereals, fruit, and good wine; silkworms are reared. Marrons glacés and chestnut jam are specialties. There are paper mills at Annonay; iron ore, diatomite, and graphite are mined. Area 2,144 sq. m. Pop. (1954) 249,077.

**Ardee.** Town of co. Louth, Irish Republic. On the Dee, 40 m. N.W. of Dublin, it has distilleries, and tanneries, and manufactures baskets. It has a 13th-century castle, now the court house. It received a charter in 1377, suffered much in the Irish and English wars, and was involved in the Sinn Féin rebellion of 1916. Market day, Tues. Pop. (1951) 2,492.

**Arden, FOREST OF.** A district of Warwickshire, England. To the N. of the Avon, it is well-wooded, and is known as the woodland country, as distinct from the open country S. of the river. The Forest of Arden is the scene of most of *As You Like It*.

**Ardennes.** A range of hills in France, Belgium, and Luxembourg. It includes remains of a great forest which, extending

probably to the Rhine, is mentioned by Caesar and other early writers; today it is confined to the wooded heights on either side of the Meuse. The Belgian Ardennes, i.e. the woods to the E. and S. of Dinant, were a popular holiday resort. Game and wild animals are plentiful, and include the wild boar. Coal, iron, lead, and other minerals are worked.

**Ardennes.** A department of France. Bounded by Belgium and the departments of Aisne, Marne, and Meuse, it has an area of 2,027 sq. m. The rivers Aisne and Meuse flow through it, and are joined by the Canal des Ardennes. Mining, especially of slate, and agriculture are the chief industries. Part of the Argonne is herein. Mézières is the capital, other towns being Rocroi, Sedan, Rethel, Charleville. Pop. (1954) 280,940.

**Ardennes, FIGHTING IN THE.** The Ardennes district figured in two important battles of the Second Great War. The first was the German break-through of May, 1940, opening move in the first battle of France. A German force of about 50 divisions had been marshalled, almost in full view of Allied observers across the frontiers, as French objections had prevented the bombing of enemy formations thus building up. Gen. (later F.-M.) von Rundstedt was in chief command of this large force, which after the break-through was charged with other important operations. Four German armies were included—under Gens. Kluge, Blaskowitz, Witzleben, and Bock. Guderian's two armoured corps were attached to the first two as a spearhead.

After crossing the Meuse and the Albert Canal (May 10–12), German armour and infantry pressed forward through the Ardennes. The region was thought to be impracticable terrain for armoured forces, and was therefore only lightly manned by French and Belgian troops. But by May 13 the enemy had reached the Meuse at a point west of Liège, and from Namur to Sedan German forces were within striking distance of the Meuse bridgeheads. The French 9th army (Gen. Corap) held the sector Namur-Mézières, which was virtually the hinge of the Allied line. Corap's troops were taking up positions when, on May 13, the Germans approached the Meuse. Across half a dozen bridges here, left undemolished by the French, the Germans poured, making a gap 50 m. wide in the Allied line.

On Corap's right was the French

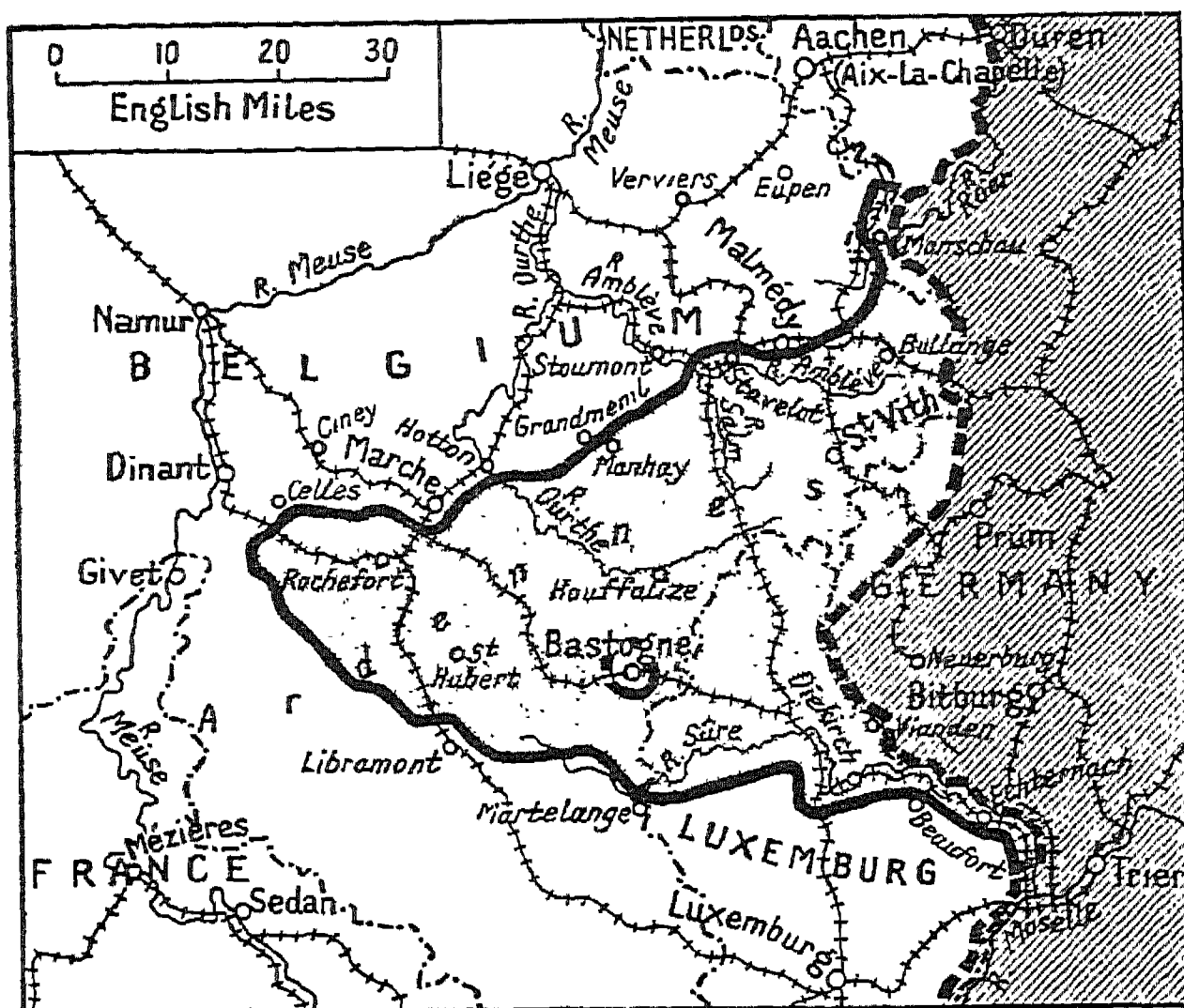
2nd army, in front of Sedan. Early on May 13 the French here were driven back and their line was breached. Sedan was abandoned. Corap's army fell back in disorder. Its commander was dismissed on May 14. Gen. Giraud, appointed as his successor, was captured by the Germans on May 16 at La Capelle. By now, along the sector between Namur and Sedan, the battle had become open warfare. The German break-through had been complete, and in due course enforced a withdrawal of Allied troops in Belgium, and the defeats ending in the evacuation of Dunkirk (*q.v.*).

The Ardennes again became the scene of heavy fighting during the last German counter-offensive of the war (*see map. p. 588*). The region had been liberated by the U.S. 1st army in Sept., 1944. An Allied offensive, with a line-up along the Rhine as its objective, began in Nov. By mid-Dec. the U.S. 9th and 1st armies had advanced beyond Aachen to the left bank of the Roer river; the U.S. 3rd army had reached the Saar. But the line between these sectors was held very lightly. Once again too much reliance had been placed on the undoubted difficulty of the Ardennes country, then in the grip of winter, for on Dec. 16 Rundstedt began an attack from a line Monschau to Echternach. Under cover of fog, which had prevented air reconnaissance, he had assembled the 5th and 6th Panzer armies (ten armoured divs.) and 14 infantry divs., also a Panzer brigade which operated in U.S. equipment and caused confusion and panic in and immediately behind the U.S. front line.

Four U.S. divs. in the Eifel area met the first onslaught, slowing but not stopping it; a fifth held St. Vith for several days. But a breach was made in the Allied line which cut off the 1st and 9th armies from their group h.q. in Luxembourg. Gen. Eisenhower immediately ordered a cessation of attack to N. and S. and concentration of all possible forces in the danger zone, to prevent the Germans from widening the base of their assault. He also placed 1st and 9th armies temporarily under F.-M. Montgomery.

Airborne, armoured, and infantry units were moved up from reserve, the 101st U.S. airborne div. with armoured support being placed at the vital road junction of Bastogne, where it was surrounded by superior German forces on Dec. 21.





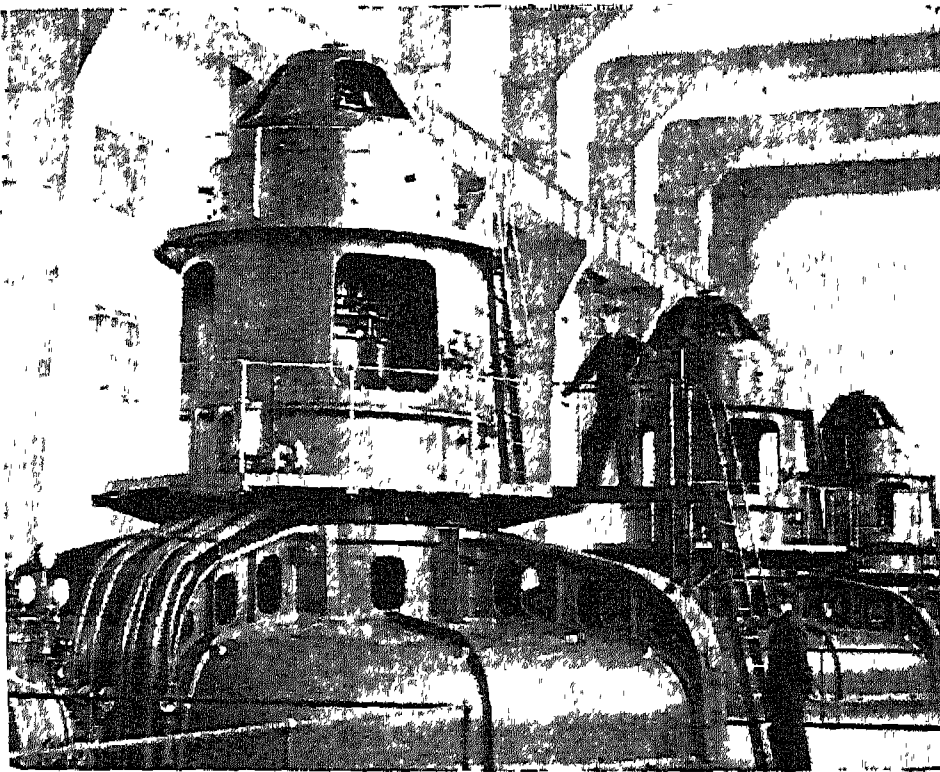
Ardennes. Map of the country affected by the last German counter-offensive, Dec., 1944. The shaded area indicates greatest extent of German penetration

The flanks of the breach at Monschau and Echternach were held, and the salient compressed from N. to S.; but penetration threatening the Meuse developed on a narrowing front, the Germans being aided by continuing fog until on Dec. 22 the weather improved, and Allied air forces began violent attacks on German rear communications. Relief by an armoured division of the 3rd army reached Bastogne on Dec. 26, on which day also the German drive, 45 m. wide at its base, and 60 m. deep, was stopped near Celles, within 4 m. of the river. The initiative then passing to the Allies, the 1st army attacked from the N. towards Houffalize on Jan. 3, 1945, the 3rd army from the S. towards the same place on Jan. 9. By Jan. 10 they were only 10 m. apart, and the Germans were beginning to withdraw from the tip of their salient. On the 16th they met, and on an unbroken front began to press the Germans eastward. By Jan. 31 the Allied line was restored to that of mid-Dec. A memorial to 76,890 Americans killed, wounded, or missing in the Ardennes battle was dedicated at Bastogne, 1950.

**Ardglass.** Parish and town of co. Down, N. Ireland. Picturesquely situated amid hills at the head of a small bay, 6 m. S.E. of Downpatrick, it is served by a branch rly. line. It was at one time the second commercial town of Ulster, but its trade has greatly declined. Small vessels can enter the harbour, a station for the

herring fishing fleet. Ardglass has ruins of several old castles or forts, said to have been built as stores by an English trading co. in the reign of Henry IV. Pop. (1951) 950.

**Ardingly.** Village of Sussex.



Ardnacrusha. Section of the huge power house of the Shannon power installation, near Limerick

England, 5 m. N. of Hayward's Heath. Here, dating from 1858, is one of the public schools founded by Canon Woodard. Otherwise the village history is dominated by memories of the Colepeper family, one of whom in 1590 built Wakehurst Place.

**Ardlamont Mystery.** Shooting fatality at Ardlamont, Argyllshire, Scotland, on Aug. 10, 1893. The victim was a youth named Hamborough, who was reading for the army with Alfred John Monson. Hamborough had recently insured his life for £20,000,

and assigned the policies to Mrs. Monson "for money received." At Monson's trial for murder, at Edinburgh, in Dec., the defence declared that he was aware that the assignment was void in Scots law, as made by a minor; and the verdict was "not proven." A man named Scott, summoned as a witness, was formally outlawed on failure to appear, the ban being later removed. On July 3, 1898, at the Old Bailey, London, Monson was sentenced to 5 years' penal servitude for conspiring to defraud the Norwich Union Life Insurance Society.

**Ardlui.** Village of Dumbartonshire, Scotland. It stands at the N. end of Loch Lomond, and has a railway station. It is also on the well-known motor road W. of the loch, and is a popular centre for boating, fishing, and mountain climbing, with Ben Vorlich (3,092 ft.) in the vicinity.

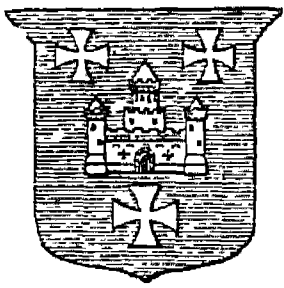
**Ardnacrusha.** Locality in co. Clare, Irish Republic, 3 m. N. of Limerick. Here is the hydro-electric power-station in the scheme which harnesses the force of the river Shannon. The construction carried out by the firm of Siemens-Schückert, was begun in 1925, and finished towards the end of 1929. Each of the three vertical turbines can develop 38,500 h.p.

**Ardnamurchan.** Parish of Argyllshire, Scotland. It forms the westernmost portion of the mainland, covers an area of 171 sq. m.; the pop. in 1951 was 948. The estate of Ardnamurchan is noted for its deer forests, beautiful rocky scenery, and salmon fisheries,

and contains the ruins of Mingary Castle, the ancient seat of the MacIans, which was twice taken by James IV and was ravaged by the Macdonalds of Antrim, 1644. Ardnamurchan Point is the westernmost extremity of the mainland of Great Britain.

**Ardoch.** Parish and village of Perthshire, Scotland. It is 12 m. N.N.E. of Stirling, and has the best-preserved Roman camp in Great Britain. The camp measures 500 ft. long by 430 ft., has huge ramparts and deep ditches, and retains three of its four gates.

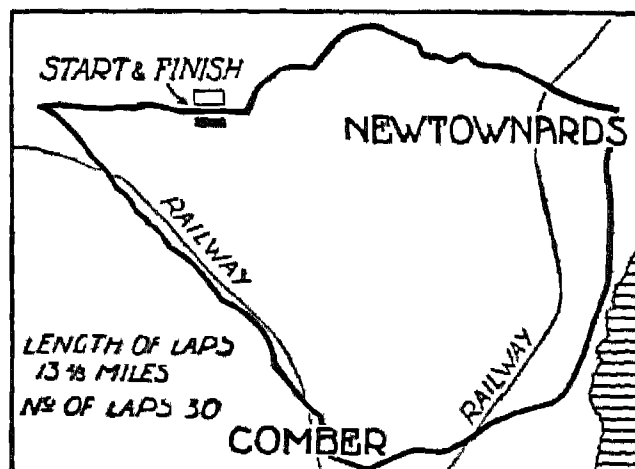
**Ardrossan.** Police burgh, seaport, and holiday resort of Ayrshire, Scotland. It is 30 m. S.W. of Glasgow by railway, and is a thriving town with a well-sheltered and accessible harbour, and commodious dock accommodation.



Ardrossan arms

Shipbuilding, engineering, oil storage, and fishing are the leading industries, and chemicals and coal the chief exports. The town owes its rise to the harbour. It was begun in 1806 by the 12th earl of Eglinton, and was to have been connected by a canal with Glasgow. The undertaking proved to be too ambitious and costly, and a few years before the death of the earl in 1819 the scheme was temporarily abandoned. The next earl carried on the work, and in 1833 the harbour, a much smaller one than originally planned, was completed, the total outlay having exceeded £200,000. Ardrossan has ruins of the castle of the Montgomeries, captured by Wallace, razed by Cromwell. Pop. (1951) 8,799.

**Ards Circuit.** A motor-racing course near Belfast, Northern Ireland, used annually from 1928 to 1936 for the Tourist Trophy race organized by the Royal Automobile Club. The course is 13½ m. of ordinary roads specially closed for the occasion. The highest average speed at which the race over 30 laps was won was 78.01 m.p.h., by F. W. Dixon and C. J. P. Dodson, driving a Riley, 1936.



Ards Circuit. Motor-racing course near Belfast. One section borders Strangford Lough (shaded)

The record for one lap is 85.52 m.p.h., by L. Lebègue, driving a Delahaye in the same year.

**Ardsley.** Former urban district in the W. Riding of Yorkshire, England, part of the county borough of Wakefield. Ardsley is served by railway, has extensive collieries, and manufactures woollens and bricks.

**Are** (Lat. *area*, piece of level ground). French unit of superficial or land measure. It is a

square whose sides are each 10 metres long, thus containing 100 sq. metres, equal to 119.6 English sq. yards. Ten ares equal one decare, 100 ares one hectare.

**Area.** Numerical measure of superficial extent. If geometry, as its name implies, originated in the measurement of land, the concept of area was probably the primitive geometrical idea. The unit of area is naturally the square whose side is the unit of length, e.g. the square foot or the square yard. The idea of area is naturally applied in the first instance to a plane surface, but may be extended to curved surfaces, such as the cylinder, cone, and sphere. See Circle; Geometry; Sphere, etc.

**Areca.** Genus of lofty palms belonging to the family Palmae. Natives of the tropics, they have a crown of long, graceful leaves which are broken up into numerous slender leaflets in two rows. *A. catechu*, of India, produces the well-known betel-nuts and catechu. Areca nut is used as a vermifuge for dogs.

**Arecibo.** Town of Puerto Rico. It stands on the N. coast, 30 m. by rly. W. of San Juan, and exports coffee and sugar. Its harbour is an open roadstead. Pop. (1950) 28,659.

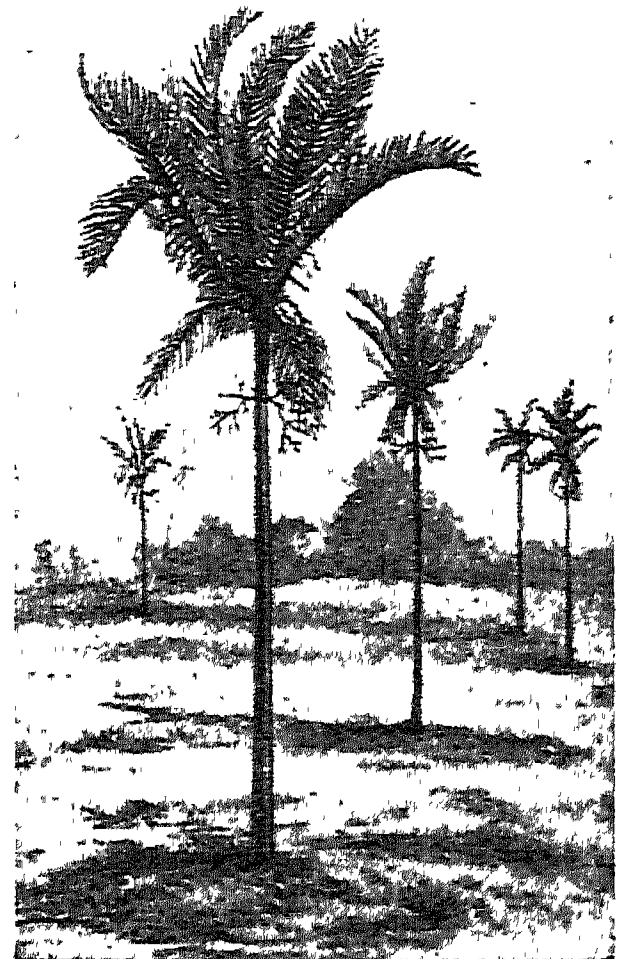
**Arena** (Latin, sand). A term specially applied to the sanded circular space reserved for gladiatorial combats in the centre of the ancient Roman amphitheatre. The sand on these arenas was intended to prevent combatants from slipping. The term is also used generally for any space or enclosure in which public contests are held, and figuratively for the scene of action of political or other struggles.

**Arenaceous Deposits** (Latin *arena*, sand). Sedimentary rocks formed of relatively coarse detrital material. They are so called in contradistinction to argillaceous or clayey deposits, and include conglomerates, grits, sandstones, gravels, and sands.

**Arenberg** OR AREMBERG. Duchy of the Holy Roman Empire. It lay between Jülich and Cologne, to the west of the river Rhine. As a separate district Arenberg appeared in the 12th century or earlier. One of its lords was made a prince of the empire and another a duke. The Napoleonic cataclysm led to the disappearance of the duchy as a semi-independent state after the congress of Vienna; but the valuable estates remained, and the titles prince and duke of Arenberg were still in use in 1956.

**Arenicola** (Lat. *arena*, sand; *colere*, to inhabit). Generic name of the lob-worm. Common on all sandy shores, where its castings may be seen at low tide. This worm is used as bait.

**Arenig Series.** Lowest major subdivision of the Ordovician system of rocks. It is named after Mt. Arenig in N. Wales, where the rocks are well developed. It is



*Areca catechu*, the Indian palm which produces the betel-nut and catechu

composed mainly of grits and dark shales, which yield a highly characteristic fauna of graptolites and trilobites. Rocks of this age occur in Western Europe, Bohemia, the Eastern U.S.A., Canada, Australia, and New Zealand. In Britain the Arenig was a period of widespread volcanic activity.

**Arensburg** (Est. Kuressaare). Swedish and more familiar name of a fortified port of Estonia S.S.R. It stands on the S. coast of Oesel, in the Baltic Sea, has a large and deep harbour, and is an important commercial centre. It imports coal and skins, and exports timber. Arensburg became an Estonian town when Oesel was given up by Russia in 1919. By the pact of Sept. 28, 1939, the U.S.S.R. was allowed to establish a military base here. Captured by the Germans in 1941, Arensburg was retaken by the Russians Oct. 7, 1944.

**Arensky**, ANTON STEPANOVICH (1861–1906). Russian composer. Born at Novgorod, Aug. 11, 1861, he studied with Zikke, and with Rimsky-Korsakov at the St. Petersburg conservatorium. In 1882 he became professor at Moscow conservatorium, and was director of music in the Imperial



Chapel, St. Petersburg, 1894-1901. He died in Finland, Feb. 25, 1906. His works include several operas.

**Areois.** Secret society formerly widespread in Polynesia. Mentioned by Captain Cook, and investigated by Ellis, this institution, fully developed in Tahiti and the Marquesas, extended to Hawaii and elsewhere. Tahiti had six lodges, adjacent islands six more, each with a grand master and seven or nine degrees, with distinctive tattooing. The initiate began by mastering the songs and dances. Membership was highly prized, and continued after death. Women held a communal position; infanticide, due to economic pressure, was characteristic of the general social custom of the time. The fraternity came in, as a puberty institution, with an immigrant people from the west, who practised sun-worship and were probably the megalithic builders. From a semi-sacred organization it degenerated into a professional dramatic troupe, long hostile to Christian missions, and now extinct. See Secret Societies.

**Areopagitica.** Prose tract by Milton. Further described as a speech for the liberty of unlicensed printing, it was published Nov. 24, 1644. It is doubtful whether Milton took the title from the oration of Isocrates, so named, or derived it from the Areopagus. It is regarded as one of the finest pieces of English prose ever written. There are good editions of the treatise by James Russell Lowell, 1890, J. W. Hales, 1898, C. E. Vaughan, 1900, and R. C. Jebb, 1918. See Milton, John.

**Areopagus** (Gr., Hill of Arēs). Hill in Athens, W. of the Acropolis, on which stood a temple to Arēs. It was the meeting-place of the famous council of the Areopagus, an assembly of elders drawn exclusively from the noble classes. Originally the governing body of Athens, its powers were limited by the constitution of Solon, later by that of Cleisthenes, and further reduced by Ephialtes in 462 B.C. Aeschylus, in his treatment of the story of Orestes, makes Orestes, when pursued by the Furies for the murder of his mother, appear before the Areopagus to submit his case to their judgement. It is a disputed point whether S. Paul delivered his speech (Acts 17) before the court itself, which was still in existence, or from the hill. See Athens.

**Arequipa.** Variant name of a volcanic mt. in the Peruvian Andes, known also as El Misti (*q.v.*).

**Arequipa.** A maritime department of S. Peru. Mountainous, with many fertile valleys, it has an area of 21,947 sq. m., produces cotton, wheat, rice, and sugar, and has valuable gold, silver, and borax deposits. Arequipa is the capital. Pop. (est.) 157,000.

**Arequipa.** A city of Peru. The capital of Arequipa department, and the third city of Peru, it is 107 m. by rly. N.N.E. of Molendo, its port, and stands on the Rio Chile, 7,750 ft. high, at the foot of El Misti volcano. It is the seat of a bishop, and possesses a handsome cathedral, several large churches, and a university. Its main industries are canning, brewing, and the making of candles, soap, and leather. It exports wool, borax, and gold and silver ores. It was founded in 1540 by Pizarro.

It has suffered severely from earthquakes, those in 1600 and 1868 causing great destruction and loss of life. Near are hot mineral springs and an observatory founded by Harvard. Pop. (est.) 90,000.

**Arēs.** In Greek mythology, the god of war, identified by the Romans with the old Sabine deity Mars. Arēs was the son of Zeus and Hera, and the lover of Aphrodite, with whom he was detected in adultery by her husband Hephaestus (Vulcan). In the struggle between Zeus and the Titans he was kept prisoner in Hades for 15 months by the giants Otus and Ephialtes. During the Trojan War he sometimes took the field on behalf of the Trojans; on one occasion he was driven off, wounded and discomfited, by Athena and the Greek hero Diomedes. He had a temple on the Areopagus, where, according to the legend, he was tried on the charge of putting to death a son of Poseidon, but was acquitted. The original home of his worship is supposed by some to have been Thrace, by others Boeotia. See Mars; Mythology.

**Aretaeus.** Greek physician and writer on medicine. He probably lived in the 1st century A.D., and was the author of treatises, most of which are extant, on diseases and their remedies.

**Arethusa.** In Greek mythology, a nymph of Elis. While bathing she was seen and amorously pursued by the river god Alpheus. At her entreaty Artemis changed her into a fountain which disappeared underground, rising again in the island of Ortygia, near Syracuse in Sicily. Alpheus is said to have mingled his stream with that of Arethusa, and it was popu-



Arequipa. The plaza, or great square, of the third city of Peru, founded by Pizarro in 1540.

larly supposed that anything thrown into the river came up again at Ortygia. Shelley tells the story in his poem *Arethusa*.

**Arethusa, H.M.S.** The first ship of this name was the French *Arethuse*, captured in the English Channel by H.M.S. *Venas* in 1759. The well-known 18th-century song, *The Arethusa*, describes a later action, 1788, of the same ship. The fourth of the name, laid down as a 50-gun frigate and launched in 1849, took part in the Crimea campaign, and was handed over in 1874 to become a training ship. For many years she was moored in the Thames off Greenwich, Kent, where thousands of boys of the Shaftesbury Homes (*q.v.*) received their training. In 1932 she was condemned by the Admiralty as unfit for further service. A four-masted barque, *Peking*, built 1911, was purchased and converted by the Shaftesbury Homes and inaugurated as the *Arethusa* training ship in 1933, with a new berth on the Medway, opposite Chatham Dockyard. During the Second Great War the government took over the ship.

The sixth *Arethusa*, launched 1913, was the first of her type of fast, lightly armoured cruisers, specially designed to operate against hostile destroyers. She was badly damaged in the battle

of Heligoland Bight, Aug. 28, 1914, but played a prominent part in the Dogger Bank battle of Jan. 24, 1915. On Feb. 11, 1916, she struck a mine, while on a North Sea patrol, and became a total wreck.

The seventh *Arethusa* was a cruiser, built Jan., 1933–Feb. 1935, at a cost of £1,251,161. She displaced 5,220 tons, and her armament included six 6-in. and eight 4-in. guns. She took part in the Norwegian campaign in 1940, and was present at the capture of the *Altmark* (*q.v.*). In 1942 she bombarded Rhodes, but was torpedoed at the end of that year. Repaired, she joined in the bombardment of the Normandy coast on June 6, 1944. Earmarked for scrapping, the *Arethusa* was refitted in 1948 as a target ship for R.N. tests of the effects of gamma rays on warships under atomic attack.

**Aretinian Syllables.** Names for the notes of the musical scale. The six syllables, to which a seventh was added, were first used by Guido d'Arezzo in the 11th century. They were derived from the first syllables of the lines of a hymn to S. John which happened to begin on successive notes of the ascending scale. The six syllables were *Ut, Re, Mi, Fa, Sol, La*, and to these was added *Si* for the seventh note. The complete stanza and notes of the hymn may be seen in Grove's Dictionary of Music and Musicians. See Tonic Sol-Fa.

**Aretino, PIETRO** (1492–1556). An Italian poet and wit. Born at Arezzo, Tuscany, and patronised by the Medicis, the emperor Charles V, and Francis I of France, he achieved notoriety as the author of 16 exceedingly licentious sonnets (*Sonetti Lussuriosi*). Such fame as remains to him he derives

from his letters, five comedies, and a tragedy, *Orazia*. He spent his last years at Venice.

**Arezzo.** Province of Tuscany, Italy. Mainly mountainous, it extends across the Apennines, and produces cereals, oil, wine, and mulberries, and manufactures leather, woollens, and hats. Area 1,274 sq. m. Pop. (1951) 325,696. An earthquake on April 26, 1917, caused considerable damage, destroying the village of Monterchi.

**Arezzo.** Town of Italy. The capital of Arezzo province and an episc. see, it stands near the junction of the rivers Arno and Chiana, 54 m. by rly. S.E. of Florence. The ancient *Arretium*, its walls were built in 1320 and rebuilt 1541–68, and its citadel, constructed in 1502, was demolished by the French in 1800. The Gothic cathedral, begun in 1277, contains many fine sculptures and the tombs of Gregory X and Tarlati di Pietramala, the warlike bishop



Arezzo, Italy. The 11th century church of S. Maria della Pieve

of Arezzo. The chief industries are pottery, and silk and cloth manufactures. One of the twelve Etruscan cities and an important military position, it was allied to Rome in 310 B.C., was sacked and repopled by Sulla, and suffered in the Ghibelline-Guelfic contests.

Occupied by the Germans after the Italian armistice of 1943, the town was subjected to frequent Allied air attacks as a key centre of communications. At the end of June, 1944, British troops of the 8th army approached the town from the S., but Arezzo was defended for three weeks before the Germans withdrew and the Allies entered. Damage was heavy, especially round the rly. station, but churches were relatively undamaged. Paintings and valuable

ceramics were lost when the museum was hit by a bomb. Three famous palaces, the Pretorio, Comunale, and Albergotti, suffered, also an ancient amphitheatre. Pop. (1951) 67,734.

**Argaeus, MOUNT** (Turk. Arjish Dag). Extinct volcano and the loftiest summit in Asia Minor. It has two craters and is regarded as 12,565 ft. high: one estimate is nearly 2,000 ft. higher. On a spur of the Taurus range, a few miles from Kaiseriye (Caesarea), it has not erupted for many centuries.



Argali. Wild sheep of the Altai Mountains

**Argali.** Wild sheep found in the Altai Mts. and on the steppes of Siberia. It is about the size of a small donkey, and has magnificent, closely ribbed horns, which form almost a complete circle. It is pale brown in colour with a white face, and in winter a large ruff of white hair develops round the neck. The argali is found at an altitude of from 3,000 ft. to 4,000 ft., the flocks keeping to the same feeding-ground from year to year. The flesh makes good mutton.

**Argall, SIR SAMUEL** (c. 1585–1626). An English adventurer. He went to Virginia in 1609, and in 1612 he abducted the Indian princess Pocahontas, and held her a willing prisoner as a means to secure peace with the Indians. He was deputy governor and admiral of Virginia, 1617–19, and served in an expedition against Algiers 1620. He was knighted in 1622, after returning to England.

**Argand, ARMÉ** (1755–1803). Swiss physician and chemist. In 1784 he invented the Argand lamp, in which combustion was much improved by the use of a cylindrical wick and the admittance of air to the central tube from below. This doubled the area of wick in contact with the air. A glass chimney was added to improve the draught. When William Murdock (*q.v.*) introduced gas lighting, he adopted Argand's principle for the burners.



Argand Burner



Pietro Aretino, Italian poet and wit  
Titian. Pitti Gallery, Florence



**Argao.** Town of the Philippine Islands. It stands on the E. coast of Cebu, 36 m. S.S.W. of Cebu town, and was founded in 1608. The locality produces rice and sugar. Pop. 35,400.

**Argaum** OR ARGAON. Town of Madhya Union, India, 31 m. N. of Akola, notable for the battle fought Nov. 28, 1803, between the British under General Wellesley, afterwards the duke of Wellington, and the troops of the Mahratta chieftains. The issue was for some time in doubt, but after fierce fighting the Mahrattas abandoned their guns and fled. The name Argaum means the city of wells.

**Argelander, FRIEDRICH WILHELM AUGUST** (1799–1875). German astronomer. He was born at Memel, March 22, 1799, studied law in Königsberg, but was induced by Bessel to devote himself to astronomy. In 1820 he became assistant at the Königsberg Observatory, in 1823 director of the observatory at Abo, and in 1828 professor at Helsingfors, to which city the Abo Observatory was transferred. In 1837 he was nominated professor-director of the new observatory at



F. W. A. Argelander,  
German astronomer

Bonn, where his chief work was carried out. His survey of the northern heavens, known as the Bonn Durchmusterung or B.D., was a complete survey of the northern

heavens mapped out into zones, extending from the north pole to two degrees S. of the equator. Argelander died at Bonn, Feb. 17, 1875. See Durchmusterung.

**Argens, JEAN BAPTISTE DE BOYER, MARQUIS D'** (1704–71). French philosophical writer. Born at Aix, Provence, and disinherited by his father, he retired to Holland. His writings attracted the notice of Frederick the Great, who invited him to Prussia and made him his chamberlain and director of the Academy. After twenty years, d'Argens fell out of favour and returned to Provence, where he died. In philosophy he was a moderate sceptic. He denied the freedom of the will and the existence of a soul-substance.

**Argensola, BARTOLOMÉ LEONARDO DE** (1562–1631). Spanish poet and historian. Born at Barbastro, Aragon, Aug. 26, 1562, and educated at the university of Huesca, he became chaplain to Maria of Austria, widow of the emperor Maximilian II. Attached

later to the suite of the count of Lemos, viceroy of Naples, he returned to Spain in 1616 and was made a canon of Saragossa, where he died Feb. 4, 1631. He left a continuation of Zurita's



B. L. de Argensola,  
Spanish poet

Print in *Bibliothèque Nationale, Paris*

caused their authors to be hailed as the Horaces of Spain.

**Argensola, LUPERCIO LEONARDO DE** (1559–1613). Spanish poet and dramatist. Born at Barbastro, Dec. 14, 1559, and educated at the universities of Huesca and Saragossa, he became secretary to Maria of Austria, chamberlain to the Archduke Albert, and historiographer royal of Aragon. His three tragedies, *Filís* (now lost), *Isabella*, and *Alexandra*, were praised by Cervantes.

**Argenson, MARC RENÉ DE VOYER, MARQUIS D'** (1652–1721). French official. Born at Venice, the son of a distinguished French advocate, he went to Paris in 1683, and was appointed lieutenant-general of the Paris police, under Louis XIV, in 1697. He filled this post for 21 years. In 1718 he was made president of the council of finance, but had to resign in 1720 on the collapse of John Law (*q.v.*). He was then made inspector-general of the French police. He died May 8, 1721.

**Argenson, RENÉ LOUIS DE VOYER DE PAULMY, MARQUIS D'** (1694–1757). French statesman. Elder son of the above, in 1719 he was made councillor of state, and in 1744 member of the council of finance and foreign minister. The friend of Voltaire and the philosophers, he endeavoured unsuccessfully to establish a European alliance of nations. He retired into private life in 1747, and was henceforth occupied with literary pursuits. He died Jan. 26, 1757.

**Argenson, MARC PIERRE DE VOYER DE PAULMY, COMTE D'** (1696–1764). French statesman. Younger son of the lieutenant-general of police, he was made councillor of state in 1724 and minister of war in 1743. He introduced important army reforms, and was present at the French victory at Fontenoy in 1745. He subsequently remodelled the French army on

Prussian lines. In 1757 he was banished from Paris at the instigation of Madame de Pompadour. The great French Encyclopédie was dedicated to him. He died in Paris, Aug. 22, 1764.

**Argenson, MARC RENÉ MARIE DE VOYER DE PAULMY, MARQUIS D'** (1771–1842). French soldier and politician. Son of the marquis de Voyer and grandson of the minister of war, he entered the army as an officer in 1789; he enthusiastically supported the Revolution, and was for a time aide-camp to Lafayette. In 1809 he was made prefect of Deux-Nèthes (Antwerp), and helped to drive the English from Walcheren. He was deputy for Belfort during the Hundred Days, and in 1830 represented Strasbourg as an advanced Radical. He died Aug. 1, 1842.

**Argent** (Fr., silver). In heraldry, one of the two metals, silver, also represented by white. It is shown in drawings by a plain surface. See Tincture.

**Argentan.** Town of France, in the department of Orne. It stands on the Orne, 31 m. by rly. N.W. of Alençon. Industries include lace making and horse raising. During the battles of 1944 heavy fighting developed around Argentan, which was reached by U.S. forces on Aug. 12. It became the southern "lip" of the Falaise (*q.v.*) gap, being captured, and the gap closed to the north of it, on Aug. 20. The church of S. Germain was severely damaged.

**Argentario.** Mountainous peninsula of Italy. Situated in the S. of Tuscany, it consists of two narrow strips of land enclosing a lagoon. On the headland stands the town of Orbetello. Its summit reaches 2,085 ft.

**Argentera, PUNTA DELL'.** Mt. of N.W. Italy, in Piedmont. It lies S.W. of Cuneo and N. of Nice and is 10,880 ft. high. It was first ascended in 1879. See also Argentièrre, Col de l'.

**Argenteuil.** Town of France, in the department of Seine-et-Oise, an important river port on the Seine, 7 m. N.N.W. of Paris, of which it is a suburb. Here was a convent of which Charlemagne's daughter became abbess and on which the emperor bestowed a garment said to be the seamless coat of Christ, still kept in the parish church. Héloïse took the veil in the convent here, where she had been educated, and S. Vincent de Paul founded a hospital.

Little of ancient Argenteuil remains except a round tower. Factories have swallowed up the

once famous vineyards, though a vintage feast is still held in Oct. Chief manufactures are machine-made embroideries, rubber and tires, motor cars and bicycles, papier-mâché, sulphate of quinine. Pop. (1954) 63,316.

**Argentière**, COL DE L'. Pass in the Maritime Alps, on the Franco-Italian frontier. It was crossed by Francis I and his army

in 1515. At the Italian end of it is the village of Argentera. It is on the road from Barcelonnette, France, to Cuneo, Italy, completed in 1870. It reaches an altitude of 6,545 ft. (*See also* Argentera, Punta dell'.)

There is a peak called Argentière, 12,820 ft., in the Mont Blanc range, towering over the village of Argentière in Haute-Savoie.

## ARGENTINA: S. AMERICAN REPUBLIC

*The physical features, constitution, social and industrial life, history, and arts of Argentina are here described. For more detailed information, see articles on Buenos Aires, Asunción, and other cities; José de San Martín, Hipólito Irigoyen, Domingo Perón, and other leaders; and on such physical features as Aconcagua, the River Plate, Tierra del Fuego*

Argentina is the second largest country of the continent of South America in both area (1,078,266 sq. m.) and population (18,955,789 in 1952). It is roughly triangular in shape with a maximum width of 980 m. near its base on the frontier with Bolivia and Paraguay. This is 2,150 m. distant from the apex at the southernmost point of Tierra del Fuego, which is separated from the mainland by the Strait of Magellan. About the size of Europe without Russia, it is bounded on the E. by the Atlantic Ocean, Uruguay, and Brazil, on the W. by the Andes Mts., which form the frontier with Chile. Argentina lies between latitudes 21° 40' S. and 55° 5' S., and its climate varies from sub-tropical in the N. to antarctic in the S., where the prison settlement of Ushuaia, in Tierra del Fuego, is the most southerly inhabited spot in the world.

The country may be divided into five main regions:

(i) The Andine, which is the eastern slope of the Cordillera of the Andes, glacial in Patagonia, alpine in the picturesque district of the southern lakes in the province of Neuquén, richly fertile in the irrigated fruit and vine growing foothills of Mendoza, desert in the arid mountains of Tucumán, which merge into the windswept plateau of the extreme north-west:

(ii) The great sub-tropical forested plain of the Chaco in the N., which stretches over the boundary into Bolivia and Paraguay, and was the scene of the Chaco War of 1932-35;

(iii) The agricultural country called "mesopotamia," which lies between the rivers Uruguay and Paraná, and includes the provinces of Entre Ríos, Corrientes, and Misiones;

(iv) The treeless, fertile grasslands of the pampa, which extends in a flat, fanlike formation for 300-400 m. from Buenos Aires and includes the provinces of Buenos Aires, Córdoba, La Pampa, and Santa Fe, covering one-fifth of the whole area of Argentina and producing most of the cattle and grain of the country;

(v) The stony desert region of Patagonia, between the Río Colorado and the Strait of Magellan, devoted to sheep raising in the N., and providing the country's largest petroleum deposits, on the Atlantic seaboard and around Comodoro Rivadavia.

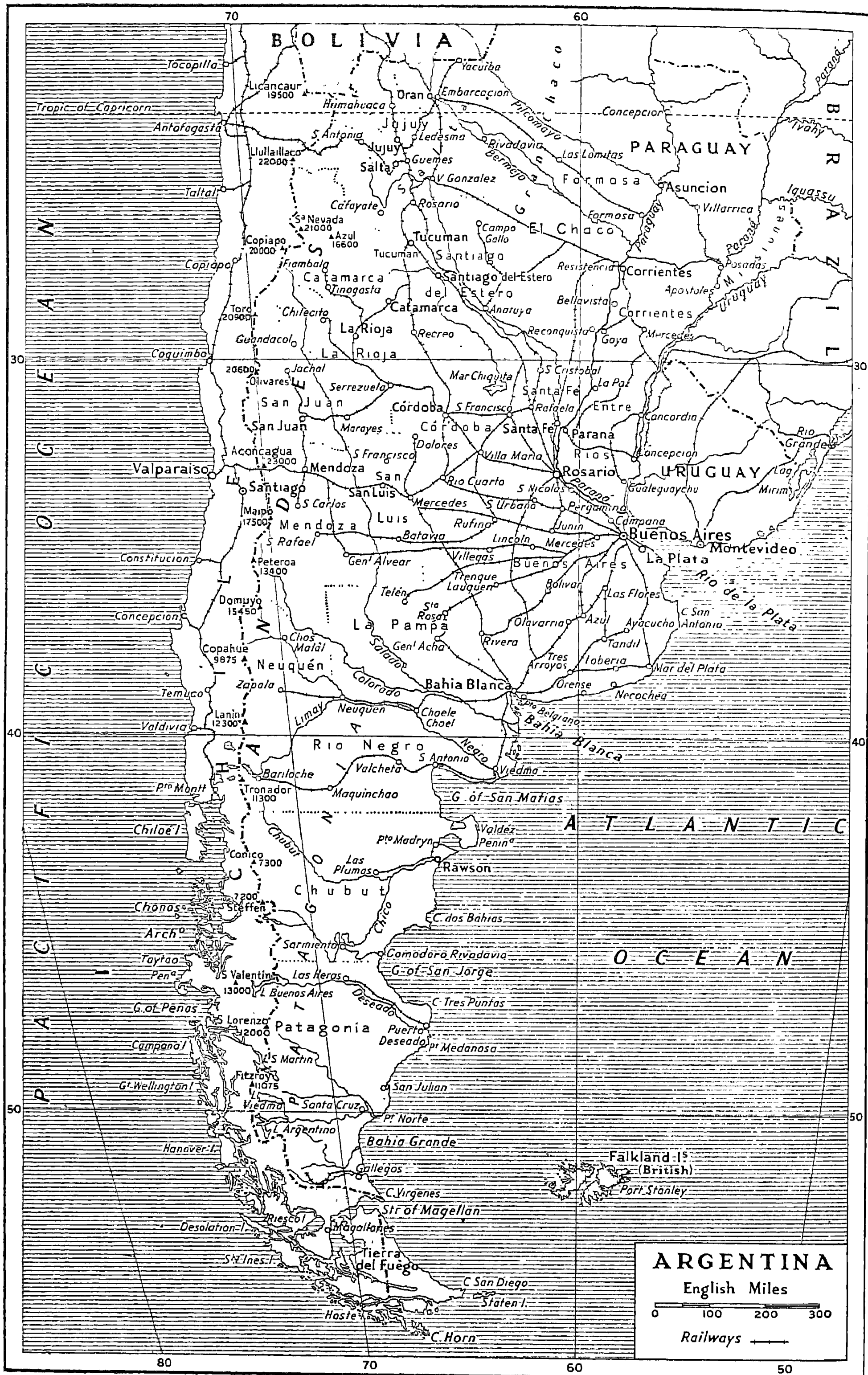
Aconcagua, in Mendoza, 23,000 ft., one of the peaks of the Andes, is the highest mountain in Argentina, and the second highest in the western hemisphere; but besides the great mountain chain of the Andes, there are smaller groups of hills, the most important of which is the Córdoba range (Sierra de Córdoba), rising out of the pampa and stretching 300 m. from N. to S. and 90 m. at its maximum width. Its highest peak is Champaquí, 8,500 ft. The Sierra del Tandil, a ridge of smaller hills running inland from the Atlantic for 150 m., lies 205 m. to the S.W. of Buenos Aires.

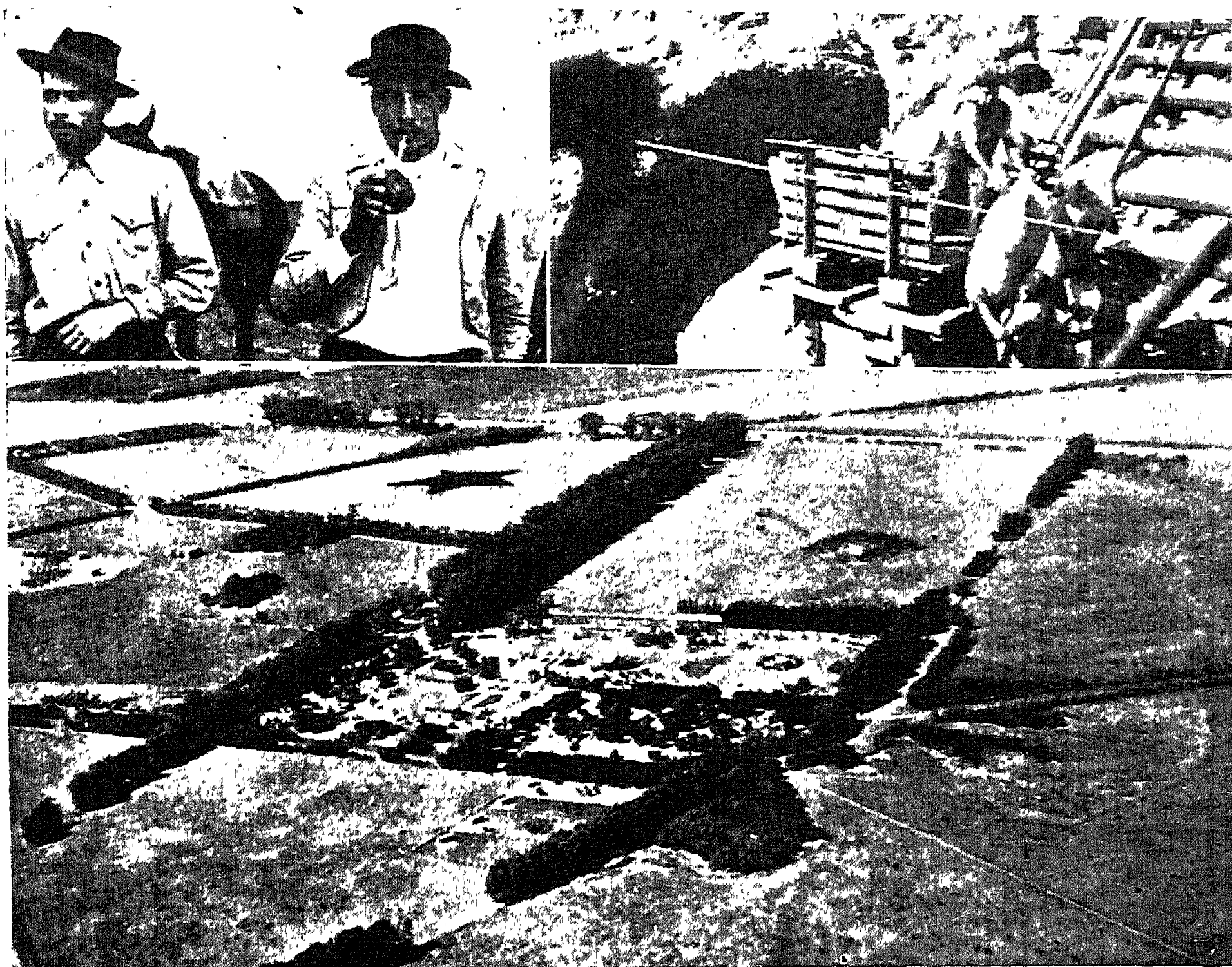
There is a further small range in Misiones, the last foothills of the great Brazilian escarpment, and here, on a tributary of the Paraná river, at the junction of Argentina with Paraguay and Brazil, are the 200-ft.-high Iguassu Falls, (nearly 40 ft. higher than Niagara), surrounded by a national park. Another national park, famous as a winter and a summer resort, lies round Lake Nahuel Huapi in the Argentine lake district of Neuquén and Río Negro provinces; it extends for 3,030 sq. m. and includes superb scenery. Mar del Plata, six



Argentina. Majestic sweep of the great Cordillera of the Andes Mountains which mark the frontier between Argentina and Chile. This view is of a locality between Mendoza and Santiago







Argentina. Typical estancia of the pampa : such a cattle ranching estate may well cover many square miles. Above (left), Gauchos drinking yerba maté tea ; (right) sacks of yerba maté being loaded at Puerto Mendes

hours by train S. of Buenos Aires, has five miles of beaches visited by more than half a million visitors during the summer season (Dec. to Easter). In the extreme N., on the Chilean border, there are various thermal centres, the most important of which is Rosario de la Frontera.

**PRODUCTS.** About a third of Argentina is forest land, 41 p.c. is natural or reclaimed grassland, 10 p.c. is cultivated, and the irrigated orchard land of the Andean foothills accounts for about 2 p.c. The remaining 14 p.c. is unproductive.

About 90 p.c. of the value of the country's export trade comes from animal and agricultural products, and most of this is produced from the pampa, where the soil and the climatic conditions are exceptionally good, in spite of periodic droughts and frosts, and, in the N., the menace of locusts. The economy of the zone depends on a careful balance between stock raising and grain production. *Estancieros* (ranch owners) lease lands to grain farmers for three to five years, after which it is sown with lucerne and returned to stock raising, while another tract is

leased for grain. If the cultivated areas are used for forage crops (oats, barley, rye, sudan grass) there is an increase in cattle raising at the expense of exportable crops of maize, wheat, and linseed. This happened in 1952, and, with the further incidence of acute drought, caused Argentina to import wheat for the first time within memory.

Government attempts to reverse this trend and to safeguard stock raising by more intensive cultivation, improved breeding, and the cleaning of the tick-infested lands on the northern fringe of the pampa so that they may support the Shorthorns, Herefords, and Aberdeen Angus strains which produce beef for export, were greatly stimulated by an increasing internal demand for meat, consequent upon a growing population with a rising standard of living; according to statistics for 1952-53, the country had about 45 million head of cattle.

Before the introduction of refrigeration, wool was Argentina's most important export, and in 1895 there were 74 million sheep. With the world-wide demand for frozen meat, sheep breeding

methods changed, and mutton-producing sheep raised in the province of Buenos Aires accounted in 1953-54 for a third of the estimated 55 million, when Argentina still was second only to Australia among wool exporting countries. The statistics for pigs increase and diminish as maize prices fall or rise. In 1952 there were nearly 4 million, mostly to supply local needs.

Beef and mutton are exported in refrigerated ships, either chilled (just above freezing point) when it must be eaten within 40 days of slaughter, or frozen solid, when it will keep almost indefinitely. All processes of meat canning are handled in the highly specialised and nationalised *frigoríficos*; the ten largest installations can handle 5,000 steers, 10,000 sheep, and 1,000 pigs in an eight-hour day. A by-product of the meat industry is the export, to the U.S.A. and Europe, of about 8 million cattle hides and 3 million calf-skins, annually, together with cattle, and pig and horse hair.

The importance of the horse began to decline with the coming of the railway, and again with



the mechanisation of cultivation. During 1930-53 the numbers fell from 10 to 7 millions, and the heavy Percherons, Clydesdales, and Shires were replaced by lighter breeds suitable for polo, racing, and riding.

Other products, principally for home consumption, are sugar, with its by-product industrial alcohol, in Tucumán, Salta, and Jujuy: dairy produce around the towns and in the Welsh colony round Rawson, in Chubut, where cheese is produced; yerba maté and tung in Misiones; rice in Corrientes, Entre Ríos, Santa Fe, Salta, and Tucumán; cotton in El Chaco; edible vegetable oils in Córdoba and Santa Fe; tobacco in Corrientes, Misiones, and Salta.

#### Fruit Growing

Grapes, cherries, peaches, plums, and apples are grown under irrigation in the Andean foothills in Mendoza, San Juan, and the valley of the Río Negro, and citrus fruit in the northern provinces of Jujuy, Salta, and Tucumán. Fresh fruit amounting to 97,374 tons was exported in 1952; fruit-drying and canning industries are continually diversifying their output; and the wine of the flourishing industry in Mendoza, San Juan, and Río Negro is improving under the advice of expert French vintners.

Before 1914 Argentine economy was almost exclusively based on pastoral and agricultural activities. Grain and meat were exported to Great Britain, the rest of Europe, and the U.S.A. in return for coal, textiles, clothing, machinery, motor cars, ships, locomotives, and luxury goods. Great Britain, whose economy was complementary, was the principal customer. As a result of two world wars, with consequent scarcity of consumer goods, Argentina began increasingly to foster home industries. But there is no hard coal, and when imports were cut off by war, railway engines burnt wood from the northern forests. The soft coal deposits in Patagonia were made accessible by the opening in 1951 of the 160-m. railway from Gallegos on the Atlantic seaboard to the coalfield. Production in 1951 was 109,926 tons, and it is estimated that the field will be an economic proposition by about 1975. Imports of coal, coke, and anthracite were 2,169,300 tons in 1951 and 1,703,700 tons in 1952, the decline being due, on account of drought, to lack of meat and grain for export.

Petroleum is obtained in some quantity from fields in Salta, Mendoza, and Neuquén; there are other deposits in the Gallegos valley. Comodoro Rivadavia, in Chubut, has the chief deposits. From this field natural gas is carried to the River Plate area through a 1,000-m. pipe-line which is joined at General Conesa by a tributary line from the Neuquén fields. A pipe-line from Yocuibá, in Salta, runs to the chief refineries at La Plata.

All iron and steel was imported until 1938, when 5,000 tons were produced. There are iron mines near Zapale in Jujuy, more than 1,000 m. by railway from Buenos Aires, and a blast furnace (under army authority) handles 18,000 tons of charcoal pig-iron annually. In 1952 about 50,000 tons of steel came from military engineering plants, and there was a private production of about 175,000 tons. There is a deposit of richer iron ore at Sierra Grande, 600 m. S. of Buenos Aires and near to the coast and cheap water transport to the industrial area of the River Plate. Total production in 1952 was estimated at 200,000 tons; completion of a projected new steel and coking plant at San Nicolás, between Rosario and Buenos Aires, was expected to bring Argentine's yearly output to 1,000,000 tons.

#### Developing Industries

During the years 1943-53 a light engineering industry was established in Córdoba for the production of motor cars, lorries, cycles, and tractors. Some locomotives are made at the General San Martín railway workshops in Mendoza. Compared with production in 1943, industry in 1953 had expanded roughly  $2\frac{1}{2}$  times for metal,  $1\frac{1}{2}$  times for machinery and vehicles, and  $3\frac{1}{2}$  times for electrical machines and appliances. Manufacture of plastics, cement, and chemical and pharmaceutical products increased.

**TRANSPORT.** During 1941-51 the Argentine merchant fleet was established and passed a capacity of 1,000,000 tons, so that exports and imports were increasingly carried in Argentine bottoms, which also competed in the carrying of foreign cargoes. Internally, the country is served by road, river, railway, and air.

On account of the dearth of gravel or stone in the soil for surfacing, the roads are poor by European and U.S. standards; nevertheless good macadam and

bitumen roads link the capital with Mar del Plata and with Rosario and Córdoba; and the four main inter-provincial roads which make up the Argentine section of the Pan-American Highway were opened to traffic in 1942.

#### Rivers and Railways

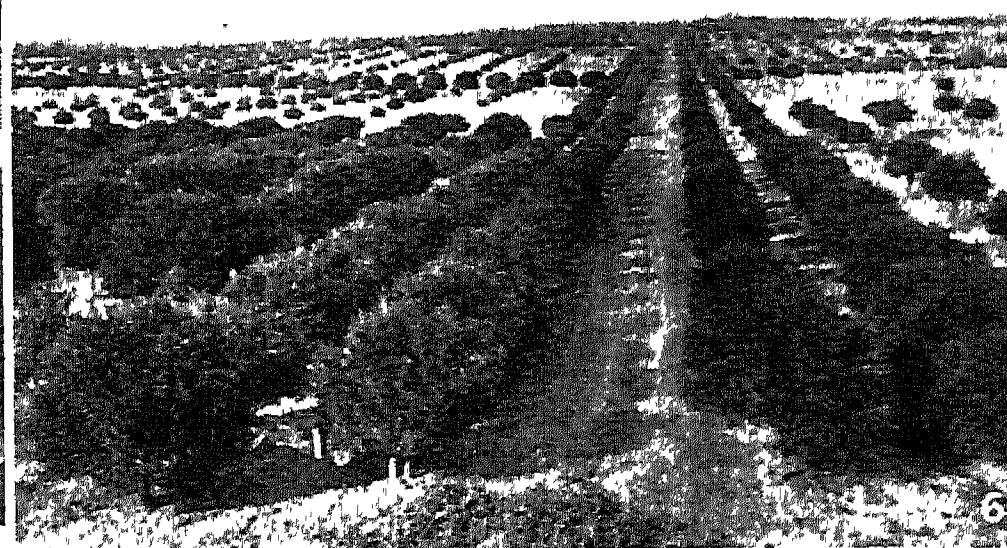
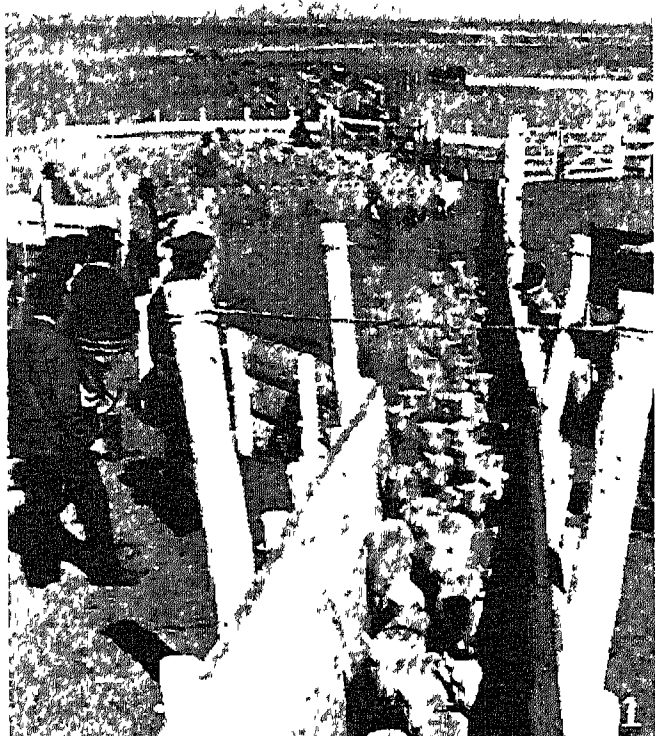
The Paraná and Uruguay rivers, which flow into the Plate, form an important artery of communication, navigable by ocean-going steamers as far as Rosario, Paraná, and Santa Fe. Smaller boats ply regularly to Corrientes and Asunción, while special flat-bottomed river steamers carry tourists as far as the Iguassu Falls on the Brazilian border. Rosario, once the second port and great grain distributor of the Argentine republic, has declined owing to the wheat shortage and the monopoly of Buenos Aires as a port of entry: in 1952 Buenos Aires carried ten times the tonnage of the hitherto busy La Plata.

The railways of Argentina are the most developed and best in the whole of South America. They were built and equipped in the main by British capital and engineers, and were British-owned until the Argentine government bought them in 1948 with the sterling balances which the country had accumulated during the Second Great War. Shortage of exportable rolling stock from abroad, and of further foreign exchange for its purchase, resulted in deterioration and considerable over-usage of the existing stock and track by a rapidly increasing population.

In addition to the internal network which links the principal towns, there are four international railways: (i) through Entre Ríos, Concordia, and Posadas to Asunción in Paraguay; (ii) through Tucumán, Jujuy, and La Quiaca to La Paz in Bolivia; (iii) through Mendoza to Santiago de Chile; and (iv) through Salta to Antofagasta in N. Chile. A line connecting Bahía Blanca on the Atlantic with Concepción on the Pacific seaboard of Chile was under construction in 1956.

Argentina's internal air lines, which connect the principal towns, were nationalised and amalgamated in 1949. International air services link Buenos Aires with Europe, North and Central America, and the other countries of South America.

**CONSTITUTION.** The Argentine constitution is based on that of the U.S.A. Since its inception



1. Flock from a sheep-run being driven through a boarded lane into the sheep train. 2. Wool wagons in Chubut. 3. Cattle on the pampa. 4. Inspecting meat for export in a frigorifico. 5. Packing grapes for export.

6. Extensive plantation of mandarin orange-trees and vines. 7. Part of a prosperous lakeside farm in the Territory of the Río Negro, S. Argentina; in the background can be seen the great range of the Andes

# **ARGENTINA : PRODUCE OF RANCH AND PLANTATION IN THIS LAND OF PLENTY**

*Photos 4, 5, 6, Argentine Ministry of Agriculture*



in 1853, it has been several times revised, notably by the Péron govt. in 1949 when the national constituent assembly ratified considerable changes and additions in the direction of social security, agrarian reform, and state ownership of mineral deposits, natural resources, and public services.

The constitution prescribes a bicameral legislature: (i) a chamber of deputies consisting of one representative per 100,000 inhabitants (if the number left over from this division is 50,000 or more, there is an extra deputy for this group); deputies are elected for six years and are eligible for re-election; half the chamber is renewed every three years, retirements being decided by lot; (ii) the senate, also elected for six years, consisting of two members from each province and two from the capital; one-third is renewed every three years. The vice-president of the republic is president of the senate.

After reorganizations in 1955, Argentina was divided into 22 provinces and the federal capital. The provinces were Buenos Aires, Catamarca, El Chaco, Chubut, Córdoba, Corrientes, Entre Ríos, Formosa, Jujuy, Mendoza, Misiones, Neuquén, La Pampa, La Rioja, Río Negro, Patagonia, Salta, San Juan, San Luis, Santa Fé, Santiago del Estero, and Tucumán. (The province of Patagonia was created in 1955 from the former territories of Santa Cruz and Tierra del Fuego.) The provinces are autonomous for all domestic affairs. The federal government at Buenos Aires deals with foreign affairs, higher education, and all matters affecting the state as a whole.

#### President's Powers

Executive power is vested in the president, who must be Argentine-born and a Roman Catholic. He is elected for a six-year term by a simple majority vote, and is thereafter eligible for immediate re-election. (The interval of six years formerly necessary was abolished, along with the electoral college, by the 1949 constitution.) The president is commander-in-chief of the armed forces, and the general administrator of the country, appointing, with senate approval, ambassadors, ministers, senior officers of the armed forces, and bishops. He has sole control over the appointment and dismissal of cabinet ministers and consular officials; he may also, with senate approval, appoint an

official to take over the government of any province, or any economic activity; and he may suspend constitutional guarantees by declaring a "state of siege" in times of crisis.

Voting is obligatory for all citizens over the age of 18; women were given the franchise in 1947. The ballot is secret. There is a supreme court which deals with cases of national significance or those involving foreigners; and subsidiary tribunals in all provinces and territories which handle local cases. The judges of the supreme and lower courts are appointed by the president with the approval of the senate. Foreigners may apply for citizenship after two years' residence, and, unless they declare an objection, automatically become naturalised after five years.

#### Nationalised Services

The Central Bank was nationalised in 1946. Railways, air services, merchant marine, telegraphic and port facilities, grain elevators, and, within the capital, gas and transport are also nationalised. In Aug., 1950, two basic rates of exchange were established: 14.00 pesos to the £1 sterling for basic exports (excluding wool) and for imports of essential fuels; and 21.00 pesos to the £1 for all other priority imports and for exports of manufactured goods and processed food. In addition, there was a "free market" rate of 38.96 pesos to the £1 for other transactions (with prior permission from the Central Bank).

RELIGION AND EDUCATION. The majority of the people of Argentina are Roman Catholics; but the constitution allows freedom of religion, and churches of other denominations exist. Teaching of religion in schools, abolished in 1884, was reintroduced after the Perón revolution of 1943; education was again secularised in 1954. Also in 1954 divorce was made legal; and in 1955 Perón abolished the status of the R.C. Church as state church.

Illiteracy steadily decreased with the introduction of free and compulsory education. By 1914 it had been reduced to 35 p.c.; in 1945 to 16.6 p.c. over the whole country and 7.7 in the city of Buenos Aires. There are some 15,000 primary and 1,000 secondary schools under the ministry of education. The curriculum of private schools is controlled either by the national or by the provincial authorities.

The oldest university, founded 1613, is at Córdoba. Others are at Buenos Aires, La Plata, and Tucumán; and there are the national universities of El Litoral and Cuyo. These universities have earned high standing in Latin America and are well endowed with up-to-date laboratories and specialised libraries. There are also schools for industrial training, arts and crafts, commercial training, rural economy, and for the training of teachers. Institutes exist in the large towns where advanced instruction is given in the fine arts, decorative arts, music, and languages. The ministry of agriculture provides rural schools where practical agriculture is taught.

PEOPLE. There are a very few pure-bred Indians left in the mountains of the N.W., the Chaco, and S. Patagonia, and western settlements along the foot of the Andes show some traces in their mestizo population of their early colonisation from Chile, Peru, and Paraguay, but this only amounts to two p.c. over the whole country. Two-thirds of the total population live in the city and province of Buenos Aires, and these people are almost wholly of European extraction. In 1914 one-third of the whole population was of foreign birth, in 1940 one-fifth, in 1950 one-sixth.

The European settlers have made the pattern of Argentine life on the groundwork of the Creole society descended from the early Spanish settlers. The U.K. and the U.S.A. have influenced the material development of the country with films, plumbing, refrigeration, meat packing, telephones, the comic strip, railways, banks, shipping, pedigree stock, gardens, and football; Germans trained the army and also created large banking and shipping interests; but the Italians, Spanish, and French have made the climate of opinion, and the cities in particular, up to the outbreak of the First Great War, were French in outlook, culture, and manners.

#### Argentine Culture

After 1943 there was a growing accent on Argentine culture and education. Argentinians have a strong regional sense, enhanced by the differences of climate and terrain in their vast land. People in Buenos Aires and the other big cities live in a different world from people of the hinterland; those of the pampas, with the horse and cow as their principal domestic animals, have a com-

pletely different horizon from the mountain folk, with their llamas and goats. In the north the schools close for three months in the year because of the heat, and in the south for three months because of the cold. In S. Patagonia the word "summer" means that it is daylight for most of the 24 hours, but never warm, and there are no flowers.

**HISTORY.** The River Plate was discovered in an attempt to find a new western route to Asia, and was navigated in an attempt to find alternative access to the "mountain of silver" and Potosí, instead of the hazardous 3,000-m. journey on foot across what is now Brazil, and the Chaco, to Bolivia. Solís made the first landing in 1516, and was killed by Indians. Magellan entered the estuary in 1520, but turned S. to discover a way into the Pacific through the strait that bear his name and commemorates his voyage. Cabot and Garcia sailed up the Paraná and Paraguay rivers and made a settlement called Sancti Spiritus, later wiped out.

In 1536 (N.S.), Pedro de Mendoza, equipped with a large force of men, horses, and provisions, founded the first settlement at Buenos Aires. It was thought that the first sight of men on horseback would so intimidate the Indians that they would capitulate, but they brought the horses down with their weapon, the bolas, and the settlement was destroyed and horses and cattle were turned loose to become wild herds of the pampa. These, and not silver, became the foundation of Argentina's wealth.

One of the followers of Mendoza sailed up the Paraná and settled, together with his men, in Asunción, where the Indians, already subjected by Inca rule, were less ferocious than the Pampas and Guaranis of the south. Meanwhile Pizarro had conquered Peru, and Spain lost interest in the "silver river" since the contents of the Potosí mines could now be exported from Puerto Bello on the Isthmus of Panama.

#### First Permanent Settlement

It was from Asunción in 1580 that Juan de Garay re-formed the settlement at Buenos Aires, which was firmly established by 1614 under Hernando Arias de Saavedra. Towards the end of the 16th century, expeditions from the viceroyalty of Peru and from Chile established the first Argentine towns among the eastern foothills of the Andes: Santiago del Estero,

Tucumán, Córdoba, Salta, La Rioja, Jujuy, San Juan, Mendoza, and San Luis.

Owing to Spain's strict maritime laws Buenos Aires lived for 270 years after its foundation by smuggling hides, tallow, and salt beef, obtained from the wild herds that roamed the pampa by the Indians and the gauchos (descendants of the first settlers and captured Indian women), who brought them into the town and sold them to the *contrabandistas*.

#### Río de la Plata Viceroyalty

In 1776 a viceroyalty of the Río de la Plata was formed which included Argentina, Uruguay, Paraguay, and Bolivia, and in 1778 Spain raised the embargo on exports. Emboldened by their defeat of the attempted British invasion of 1806, the Porteños (natives of Buenos Aires) deposed the viceroy on March 25, 1810. On July 9, 1816, in face of the threat of invasion by viceregal forces from Peru, and a Spanish blockade of the Río de la Plata (River Plate), the rebels declared their independence at Tucumán, and consolidated it by the success in arms of the national hero José de San Martín (1778-1850).

Thereafter a struggle for control between a centralised government in Buenos Aires and the supporters of local autonomy, aided by the great landowners and gauchos, lasted until 1853, when, at the downfall of the dictator Rosas, federation was recognized in the constitution. But the province of Buenos Aires seceded and civil war persisted until 1861, when Bartolomé Mitre was made the first president of the federal government at Buenos Aires.

The supremacy of the capital was confirmed through the defeat of the Indian tribes of the pampa by Julio Roca (1843-1914). This inaugurated the peaceful settlement of the pastoral and later agrarian economy upon which the fortune of the country still depends. The dividing up of the pampa into great estancias among Roca's officers in recognition of their services gave rise to the system of rule by a landed oligarchy that persisted until 1943. The *estancieros* employed first the gauchos and later, as the rearing of cattle became more specialised, European immigrants, of whom there were more than six million during 1857-1930. During the same period there was increasing investment of foreign capital in the country, mostly British. After

the outbreak of the Second Great War in 1945 the U.S.A. became the chief supplier of foreign capital.

The first radical president of Argentina, himself a large landowner, was Hipólito Irigoyen (c. 1855-1933). He was elected in 1916 under the laws providing for universal (male) suffrage and the secret ballot passed in 1912 during the presidency, 1910-14, of Roque Sáenz Peña (1851-1914). Irigoyen introduced minimum wage laws, and an eight-hour day, fixed rents, and improved workers' housing. His successor, 1922-28, Marcelo Torcuato de Alvear (1868-1942) continued this liberal programme and promoted the period of the greatest prosperity the country has known. The world depression of 1929-33, and the failure of Irigoyen's leadership during his second term of office, led to a conservative reaction which was paramount until the revolution of 1943 ushered in the Peronista regime.

#### Peronista Regime

Juan Domingo Perón (b. 1895), leader of the National Labour party, and of the Peronist Radicals, attained the presidency in 1946 in the first elections held since 1938. A new constitution was introduced, and the Central Bank, railways, internal air-lines, and some shipping were nationalised. In 1947 women were given the vote, and a special tax on employers was introduced for the benefit of state-aided industries. A general election held in 1948 was boycotted by opposition parties. An act of 1949 recognized the legality of all existing parties, but made them liable to dissolution by government decree. Perón, re-elected for a second six-year term in 1952, was driven into exile by a military revolution, Sept., 1955, headed by General Eduardo Lonardi (1896-1956), in his turn deposed two months later by General Pedro Eugenio Aramburu.

During Perón's regime there was an improvement in the condition of the workers, a deterioration in that of the landowners; much constructional work was undertaken, accompanied, however, by censorship of press and radio, serious inflation and exhaustion of foreign exchange reserves, and suppression of all democratic opposition.

**LANGUAGE.** The people of Argentina speak Spanish. But naturally in a continent the size of Latin America, there are many variations in the types of Spanish



spoken, and the Argentine variety, judged by Castilian standards, is poor. Argentina is notable for its pronunciation of the "ll." For instance, in Spain, and in the more northern Spanish-speaking countries of Latin America, the pronunciation of the word for street, *calle*, is "cahye," whereas in Argentina, it is pronounced "cahje." As is to be expected in a land where the population is made up of people of very various European origins, many words not used in Spain or any other Spanish-speaking country of America have crept by common usage into the Argentine variety of Spanish.

**LITERATURE, ART, ETC.** Until the end of the 1930s Argentina was the cultural leader of Latin America. Outstanding names in its literature and intellectual life are: Esteban Echeverría (1805-1951), a romantic poet whose greatest work was *La Cautiva*, 1837; José Mármot (1818-1881), author of the novel *Amalia*; Bartolomé Mitre (1821-1906), journalist (founder of the daily newspaper *La Nación*), poet of nature, and a leading historian of S. America; Juan Bautista Alberdi (1810-1884), diplomat, journalist, and prolific writer of prose; Domingo Sarmiento (1811-1888), statesman, educator, poet, and author of *Facundo*, a sociopolitical biography of the lieutenant of the dictator Rosas; José Hernández (1834-1886), who wrote *Martin Fierro*, the great book of primitive gaucho life in Argentina; Estanislao del Campo (1835-1880), who wrote a burlesque poem, *Fausto*, in gaucho dialect; and Ruben Dario (1867-1916), who, though born in Nicaragua, spent most of his life in Argentina, and whose influence on modern Spanish verse has been profound.

#### Twentieth-Century Writers

In the 20th century the best-known Argentine novelist is Hugo Wast (Gustavo Martinez Zuviria, b. 1883), whose popular novels have been translated into many languages. The greatest poet, essayist, and publicist was Leopoldo Lugones (1874-1938). A novelist and historian whose works have been translated into many languages is Ricardo Rojas (b. 1882); another well known historian is Ricardo Levene (b. 1885). A poetess of outstanding merit was Alfonsina Storni (1892-1938). An Argentine academy of letters, founded 1921, has a membership limited to 20.

Of Argentina's two world famous newspapers, *La Prensa*, known for its high literary standards and independent views, is owned by the family of the founder, José C. Paz (1842-1912), who started it in 1869 (it was appropriated by Perón in 1951, restored to Gainza Paz 1956); *La Nación*, a paper with a strong R.C. policy, was founded in 1870 by Bartolomé Mitre.

During the 19th century native music was for the most part confined to folk dances, including the pericón (a native country dance) and the tango. The ever-growing number of European musicians visiting Argentina helped to create a local school of music. The best known composers are Julian Aguirre (1869-1924) and Alberto Williams (1862-1952), the "grand old man" of Argentine music. The fine Colon Opera House in Buenos Aires was modelled on the Scala at Milan.

**Bibliography.** The Federal System of the Argentine Republic, L. S. Rowe, 1921; The Argentine Republic, P. Denis, 1922; The New Argentina, W. H. Koebel, 1923; Peopling the Argentine Pampas, M. Jefferson, 1926; The River Plate Republics, W. E. Browning, 1928; A History of the Argentine Republic, F. A. Kirkpatrick, 1931; Gauchos and Tomtoms, B. M. Wallenstein, 1932; A Tentative Bibliography of Belles Lettres of the Argentine Republic, A. L. Coester, 1933; History of Argentina, R. Levene, Eng. trans. 1938; Britain and the Independence of Latin America, C. K. Webster, 1938; River Plate Personalities, W. J. Lamb, 1939; The Way Southward, A. F. Tschiffely, 1940; Argentina, J. W. White, 1942; The Argentine Republic, Y. F. Rennie, 1945; The United States of Argentina, A. P. Whitaker, 1955; Argentina, G. Pendle, 1955; South America Yearbook (annually).

**Argentina, LA.** Stage name of Antonia Merée (1890-1936), Spanish dancer. Born in Buenos Aires, Sept. 4, 1890, she went to Spain at the age of two with her parents, who became members of the company of the Madrid Royal Opera House. Argentina joined the company at the age of five. At eleven she was a première danseuse. Later, moving to Paris, she became internationally famous.



Argentina, Spanish dancer famed for the precision of her footwork and spirited playing of the castanets.

Her performances of Spanish dances and her playing of the castanets were unrivalled. She toured Europe and America, appearing regularly in London from 1931, where her *Danse Rituelle du Feu* became specially popular. She died at Bayonne, July 18, 1936.

La Argentina was instrumental in reviving Spanish classical dancing and in popularising the music of Albéniz, Granados, and Falla.

#### Argentine Pass.

Pass in the Rocky Mts. In the state of Colorado, U.S.A., near Denver, it reaches just over 13,000 ft.

**Argentinita, LA.** Stage name of Encarnación Lopez (1898-1945), born in Buenos Aires, who was acclaimed in Spain for her Spanish dancing, worked in ballet in New York, and collaborated with García Lorca in 1932 in the founding of the Madrid ballet.

**Argentite.** One of the principal ores of silver. It is the source from which much of the silver is obtained in the mines of Germany, Bohemia, Hungary, Mexico, and Nevada. A sulphide, it has a composition of about 86.5% silver and 13.5% sulphur. It is always found combined with other sulphides, particularly those of copper and lead.

**Argentoratum.** Latin name for Strasbourg. Most of the books printed at Strasbourg during the 15th-17th centuries bear the impress Argentoratum.

**Arges.** River of Rumania. Rising in the Transylvanian Alps, it flows for 150 m. S. and S.E. to the Danube below Oltenitsa.

The battle of the Arges was fought Nov. 30-Dec. 3, 1916, between Austro-German forces under Falkenhayn and Mackensen and the Rumanians under Avarescu. It resulted in a heavy defeat for the Rumanians and their evacuation of Bukarest, occupied by Mackensen on Dec. 6.

**Arghana Maden.** Town of Turkey, in Elazig vilayet. On the river Tigris, 50 m. N.W. of Diarbekir, it has an old and very rich copper mine.

**Argives** (Greek *Argeioi*; Lat. *Argivi*). Inhabitants of Argos in Greece. Homer used the term for the Greeks in general.

**Argob.** Hebrew name for the district containing threescore cities ruled by Og king of Bashan (Deut. 3; 1 Kings 4). Called by the Greeks Trachonitis (Luke 3), it is usually identified with the modern El Lejah. Described as an ocean of basaltic rocks and boulders, it is studded with deserted towns and ancient villages. See Palestine.

**Argol.** Crude acid potassium tartrate deposited from wine. When grape juice ferments the acid potassium tartrate ( $\text{KHC}_4\text{H}_4\text{O}_6$ ), which it contains naturally, is deposited because it is less soluble in the alcohol which results from the fermentation process. Argol is deposited as a crystalline crust on the sides of the vat, and when this is recrystallised it is known as tartar; from this, by further purification, cream of tartar is obtained.

Argol occurs in commerce as red argol and white argol, according as it is deposited from red or white grapes. From argol tartaric acid ( $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ ) is made by neutralising it with whiting and afterwards boiling with calcium sulphate. This forms calcium tartrate and potassium sulphate. The latter is separated out by crystallisation and the calcium tartrate treated with sulphuric acid.

**Argolis.** A district of ancient Greece. Occupying the N.E. part of Peloponnesus, bordering the Gulf of Aegina or the Saronic Gulf, and the Argolicus Sinus or Gulf of Nauplia, it was the territory surrounding Argos. It became part of the Roman prov. of Achaëa in 146 B.C. It has many legendary associations, including that of the Lernean Marsh, where Hercules slew the Hydra. Argolis is a nome or department of modern Greece. Its capital is Nauplia. Pop. (1951) 85,289.

**Argon** (Gr. *argos*, inert). One of the gases which go to make up the atmosphere. It exists in the proportion of nearly 1 p.c. of air.

At the meeting of the British Association in 1882 Lord Rayleigh mentioned that he had begun a research on the densities of hydrogen and oxygen, and in the experiments he found that the density of nitrogen varies according as it is prepared from the atmosphere or from ammonia. In 1893 chemists were asked to make suggestions to account for this difference. Sir William Ramsay took up the work and adopted the method, devised by Cavendish nearly a century before, of removing the oxygen from air by means of an electric discharge. He also called attention to a remark by Cavendish that there ap-

peared to be a small amount of nitrogen differing from the rest in that it could not be reduced to nitrous acid. He devised a method of removing the nitrogen from air by employing magnesium metal and an electric current, and in this way collected a fairly large amount of the residue. Tested by the spectrum method of analysis, the residue gave a different spectrum from that of nitrogen. This proved that a new gas had been discovered, and it was named argon, and the fact published at the meeting of the British Association in 1894.

Argon is an inert gas, and attempts to make it combine with other elements have failed. Sir James Dewar has liquefied and solidified it. Argon is now prepared with comparative ease from the air, provided it is not required in a state of absolute purity.

Argon is used in many types of electric lamps and display signs and in geiger counter tubes. Its chemical symbol is A, atomic weight 39.9; atomic number 18; boiling point  $-186^\circ\text{C}$ .

**Argonaut.** Cuttle fish of the genus *Argonauta*. The beautifully ribbed, translucent shell is secreted



Argonaut, or paper nautilus. The upper figure shows the animal swimming

by the flat expansions of two of the arms, or tentacles, of the animal, and it is not attached in any way to the body. Its object is to serve as a receptacle for the eggs. The argonaut is common in the tropic seas: one species, the paper nautilus, inhabits the Mediterranean.

**Argonauts** (Gr., sailors of the Argo). In Greek mythology, the heroes who, under the leadership of Jason, sailed to Aea or Colchis, on the Black Sea, in search of the Golden Fleece. They were so called from the name of the 50-oared ship Argo which was built by Argos.

Jason was the son of Aeson, who had been deprived of the kingship of Iolcus in Thessaly by his half-brother Pelias. To get rid of Jason, Pelias suggested to him that he should fetch the Golden Fleece, which hung in the sacred grove of Mars at Colchis.

Aeetes, king of Colchis, agreed to surrender the Fleece to Jason provided he tamed two fire-breathing oxen with feet of brass, and with them ploughed a two-acre field. He was then to sow the teeth of a dragon, which would produce a crop of armed men, who had all to be destroyed. Finally, he had to kill the dragon guarding the Fleece.

By the help of the magic powers of Medea, the king's daughter, who fell in love with him, Jason succeeded in fulfilling all the conditions, obtained the prize, and started home, taking with him Medea and her young brother Absyrtus. They were pursued by Aeetes, but Medea delayed the pursuit by murdering her brother and scattering his limbs in the sea, so that the father would have to pick them up for burial. Zeus in rage sent a storm: the ship declared that the expedition must visit Circe in Ausonia before it could be purified. After evading the fatal allurements of the Sirens, and escaping the perils of Scylla and Charybdis, the voyagers eventually returned to Iolcus.

The voyage of the Argonauts is the subject of a Greek poem by Apollonius of Rhodes and of a Latin adaptation by Valerius Flaccus, and is described in Kingsley's *The Heroes*. See Jason; Medea.

**Argo Navis** OR THE SHIP ARGO.

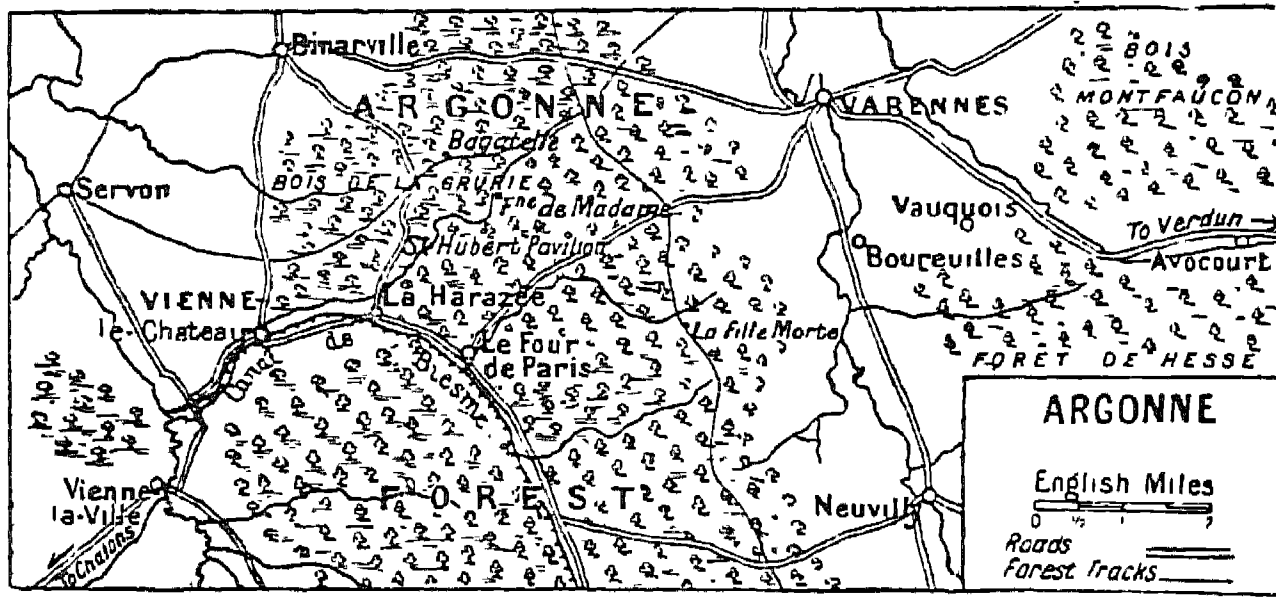
One of the southern constellations, most of which lies below the English horizon. It is so vast that, for convenience of reference, it has been subdivided into four minor groups: Pyxis, the compass; Vela, the sails; Puppis, the stern; and Carina, the keel. It contains 15 stars brighter than the third magnitude, among them Canopus, which is next in brightness to Sirius. See Constellations.

**Argonne.** District in E. France, known from its wooded character as the forest of Argonne. It covers part of the departments of Ardennes and Meuse, and lies between Toul and Mézières, being a stretch of high ground between the basins of the Meuse and the Aisne. About 10 m. wide from east to west and 40 m. long from north to south, it is densely covered with undergrowth and intersected with ravines.

**Argonne, CAMPAIGNS IN THE.** Series of operations in the First Great War. The Argonne owed its strategic importance to the fact that a successful advance through it by the Germans would have turned Châlons and Verdun and rendered the French front on the Meuse untenable.

The German Crown Prince with the 5th German army passed





**Argonne.** Map of the forested area through which the Germans menaced Verdun in 1914 and 1915, and through which the French and Americans drove back the invaders in the closing stages of the First Great War

through the Argonne in the first advance of Aug.-Sept., 1914, and by him Varennes was many times taken and relinquished. During the winter the two entrenched forces were in close contact parted by only a few yards of almost impenetrable bush, barbed wire, and concealed machine-gun posts. In Jan., 1915, the French failed in an effort to storm Bour-  
euilles. In Feb. a fierce struggle opened for the strongly fortified village of Vauquois half of which was captured by the French.

In June, 1915, the German staff determined to make a thrust through the Argonne with about 80,000 men. French positions were heavily bombarded with gas-shells, and between June 20 and July 2 a series of assaults was delivered. About mid-July the battles ended in a virtual stalemate, the French holding all the vital positions.

In the autumn of 1918 Foch, as supreme Allied commander, resolved to clear the Argonne. His force included 22 U.S. divisions with a total strength of 631,000 men (though only 3 divisions had taken part in previous operations); together with 4 French divisions comprising 138,000 troops, including artillery. On the German side 46 divisions were employed.

The U.S. attack opened on Sept. 26 on a front of 18 m. Close cooperation of artillery could not be given, the U.S. staff having put its main trust in telephones and the lines being cut by German artillery fire. Other difficulties hampering the Americans were the lack of roads and light railways; and, as always, the mud. By Oct. 4 the advance totalled only 7 m. But the Germans were at no time strong enough to counter-attack, and on Oct. 29 Marwitz the German commander, fell back on the W. bank of the Meuse and blew up his ammunition dumps. By Nov. 2 the whole Argonne

region was cleared and an advance of 16 m. accomplished. American casualties in the battle numbered 115,529. including 15,599 killed French casualties were 7,000.

**Argos.** City of ancient Greece in Argolis, 3 m. inland from the head of the Gulf of Nauplia, and said to be the oldest city of Greece; it became the nucleus of a kingdom, with Mycenae as its capital. From being the predominant state, it fell in the 7th century B.C. under the influence of Sparta, but remained independent until conquered by the Romans in 146 B.C. Many remains have been excavated, including those of the Heraeum or temple of Hera, which contained a gold and ivory statue of the goddess. The modern Argos a flourishing town and a junction on the rly. from Corinth to Tripolis, has remains of its cyclopean walls and rock-hewn amphitheatre. Pop. (1951) 14,728.

**Argostoli.** City and seaport of the Ionian Islands, Greece. The capital of the island of Cephallonia, it stands on the eastern shore of the Gulf of Argostoli, and had a good harbour and a naval school. It had a shipbuilding industry, exported currants, wine, and oil. It was almost completely destroyed by an earthquake in 1953. Pop. (1951) 8,724.

**Argosy.** Term used, generally figuratively, in the sense of a richly laden ship. Though popularly connected with the vessel Argo in which Jason bore off the Golden Fleece (*see* Argonauts), the word was said in the 17th century to be derived from Aragouse, a corruption o. Ragosie, *i.e.*, a ship from the wealthy port, Ragusa.

**Argot.** French term for slang. It is applied to the colloquial language of general society; the special vocabulary of a class, community, profession, or calling. and—the earliest meaning—the jargon of thieves, rogues, and vagabonds. French slang dates

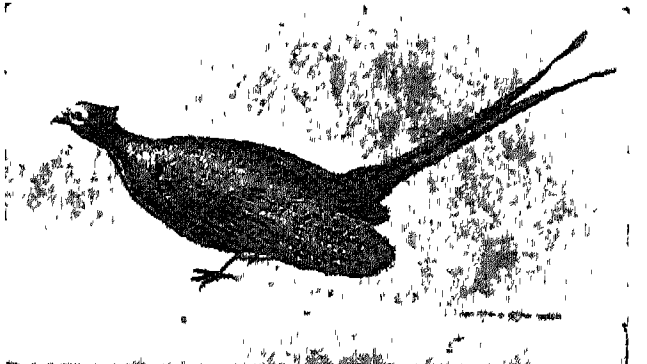
back to the 14th or 15th century, and may have originated among thieves. among the gipsies just appearing, among students, or in the motley gatherings at the great medieval French fairs. The 15th century vagabond-poet François Villon, was the first to use slang in literature, and some of his poems are written entirely in argot.

**Argument** (Latin *arguere*, to prove). That part of a proof on which rests its validity or power of convincing. The term is often used in the sense of argumentation (demonstration of the proof of something). Arguments may be demonstrative, based upon absolute, necessary truths; or dialectic, based upon relative, contingent propositions, which cannot produce conviction. The *argumentum ad hominem* (to the man) is an argument addressed directly to an opponent, based on his own previous actions or admissions. *A priori* arguments have their origin in reason, *a posteriori* are deduced from experience.

**Argun.** River of Asia. It rises in the W. of Manchuria and flows mainly N. between that country and Siberia, and unites with the Shilka at Ust-Stryelka to form the Amur. Its length is about 500 m.

**Argus.** In Greek mythology a being with 100 eyes, of which only two slept at a time. Hera appointed him guardian of Io, whom Zeus had changed into a heifer, but all his eyes were lulled to sleep by the lyre of Hermes. Hera thereupon put his eyes on the tail of a peacock, the bird sacred to her. Argus was also the name of the dog of Ulysses, who died from joy when his master returned after an absence of 20 years.

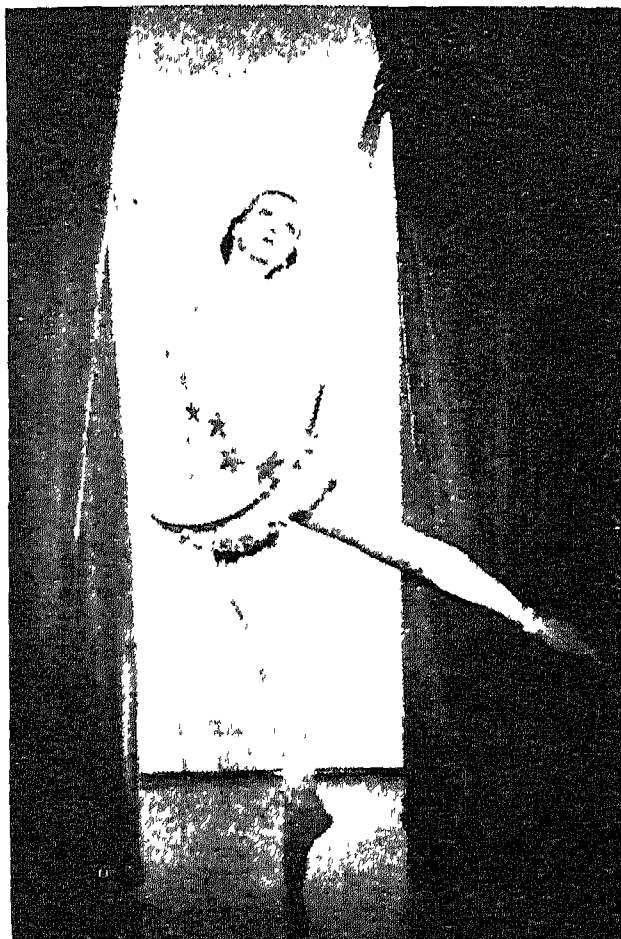
**Argus Pheasant.** Species of pheasant found in Malaya and Sumatra. It is notable for the extra-



**Argus Pheasant**, bird of beautiful plumage. It is a native of Malaysia

ordinary length of the tail feathers and for the beautiful, eye-like spots on its plumage.

**Argyle, PEARL** (1910-47). British dancer. Born at Johannesburg, Nov. 7, 1910, she studied dancing under Marie Rambert in London. From 1930 to 1931 she danced in three seasons of ballet with Kar-sayina at the Lyric Theatre, Ham-



Pearl Argyle. British dancer, member of several famous ballet companies

mersmith, and appeared in C. B. Cochran's *Helen* at the Adelphi Theatre, 1932. Her performances in *Carnaval*, *Aurora's Wedding*, and *L'Après-midi d'un Faune* reached a brilliant level at the Mercury Theatre in 1934. In 1935 she joined the Sadler's Wells company. She died Jan. 28, 1947.

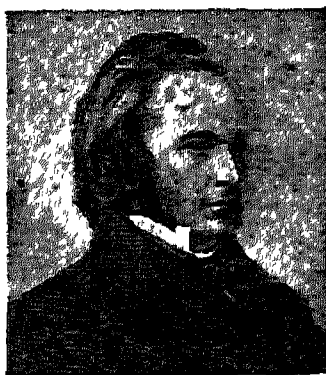
**Argyll, EARL AND DUKE OF.** Scottish titles borne since 1457 and 1701 respectively by the family of Campbell. Duncan Campbell of Loch Awe was a lord of Scotland about 1400; his grandson Colin was 1st earl. Archibald, 2nd earl, was killed at Flodden. Archibald, son of the 9th earl, recovered the titles and estates after the Revolution of 1688, and for helping William III was rewarded in 1701 with a dukedom. John, the 2nd duke, served at Malplaquet. John the 5th duke, the second husband of Elizabeth Gunning (*q.v.*), was made a baron of Great Britain in 1766. The 8th and 9th dukes are noticed separately below. In 1949 the titles and estates passed to the 11th duke, Ian (b. 1903), who succeeded a cousin.

The duke is hereditary master of the royal household in Scotland, keeper of the great seal of Scotland, admiral of the western isles, and keeper of the castles of Carrick, Dunoon, and Dunstaffnage. His chief seat is Inveraray Castle. The eldest son is usually known as the marquess of Lorne, and the dukedom has been since 1892 a peerage of the United Kingdom. Readers of Macaulay's *History*, Scott's *Legend of Montrose*, and Stevenson's *Catriona* will know of the power once wielded by the dukes in the W. Highlands.

**Argyll, ARCHIBALD CAMPBELL, MARQUESS OF (1598-1661).** Scottish soldier. As Lord Lorne he began as a young man to administer the estates of his Roman Catholic father. In 1638 he became the 8th earl; and with the quarrel between Charles I and the Covenanters coming to a head, both sides were anxious to secure his aid. A dour Presbyterian. Argyll acted as a military leader of the Covenanters in 1639. Though made a marquess by the king, in the Civil War he took up arms against Montrose and the Royalists, who defeated him at Inverlochy, Feb. 2, 1645. He fled to England, but returned to power and associated himself with Cromwell. After the execution of the king, he changed sides again and crowned Charles II at Scone in 1651. Commonwealth soldiers marched on Inveraray and after a siege the marquess submitted. Found guilty of treason by the Restoration parliament, he was beheaded in Edinburgh, May 27, 1661.

**Argyll, ARCHIBALD CAMPBELL, 9TH EARL OF (1629-85).** Scottish soldier. Eldest son of the above marquess, he fought at Dunbar for Charles II, but submitted to Cromwell in 1655. On refusing to renounce allegiance to the Stuarts he was imprisoned. Released at the Restoration, he was warmly received by Charles, and in 1663 the title of earl and the estates of his father were given back. Through protesting at the harshness employed against the Covenanters, 1671, he fell into disfavour, and in 1681 was tried for treason. After a travesty of justice Argyll was condemned, but escaped from prison to Holland. There he met Monmouth and agreed on the proposed invasion of Britain. He landed in Scotland, but the cause failed. Taken prisoner, he was beheaded in Edinburgh, June 30, 1685, under the sentence of 1681.

**Argyll, GEORGE DOUGLAS CAMPBELL, 8TH DUKE OF (1823-1900).** British statesman and writer. Born April 30, 1823, he succeeded to the title in 1847 and came quickly into prominence in the House of Lords. In 1853 he was made lord privy seal under Aberdeen, and from 1855-58 was postmaster-general. In the Whig ministry of 1859-66 he was again lord



George Douglas Campbell, 8th Duke of Argyll

privy seal, and was secretary for India, 1868-74. In 1880 Gladstone made him lord privy seal, but he resigned next year, disapproving of the Irish land bill. Later he bitterly opposed Gladstone's Home Rule measure, but the estrangement was healed when both appeared in public on behalf of the Armenians. The duke died April 24, 1900. He wrote *The Reign of Law*, 1867; *The Eastern Question*, 1879; *Our Responsibilities for Turkey*, 1896. *Consult Autobiography and Memoirs*, 1906.

**Argyll, JOHN DOUGLAS SUTHERLAND CAMPBELL, 9TH DUKE OF (1845-1914).** British politician. He was educated at Eton, St. Andrews, and Trinity College, Cambridge. As the marquess of Lorne he married in 1871 the Princess Louise (1848-1939), fourth daughter of Queen Victoria. During 1878-83 he was governor-general of Canada. He was Liberal member of Parliament for Argyllshire 1868-78, and Liberal Unionist member for S. Manchester 1895-1900. He succeeded to the dukedom and estates in 1900, and died May 2, 1914.

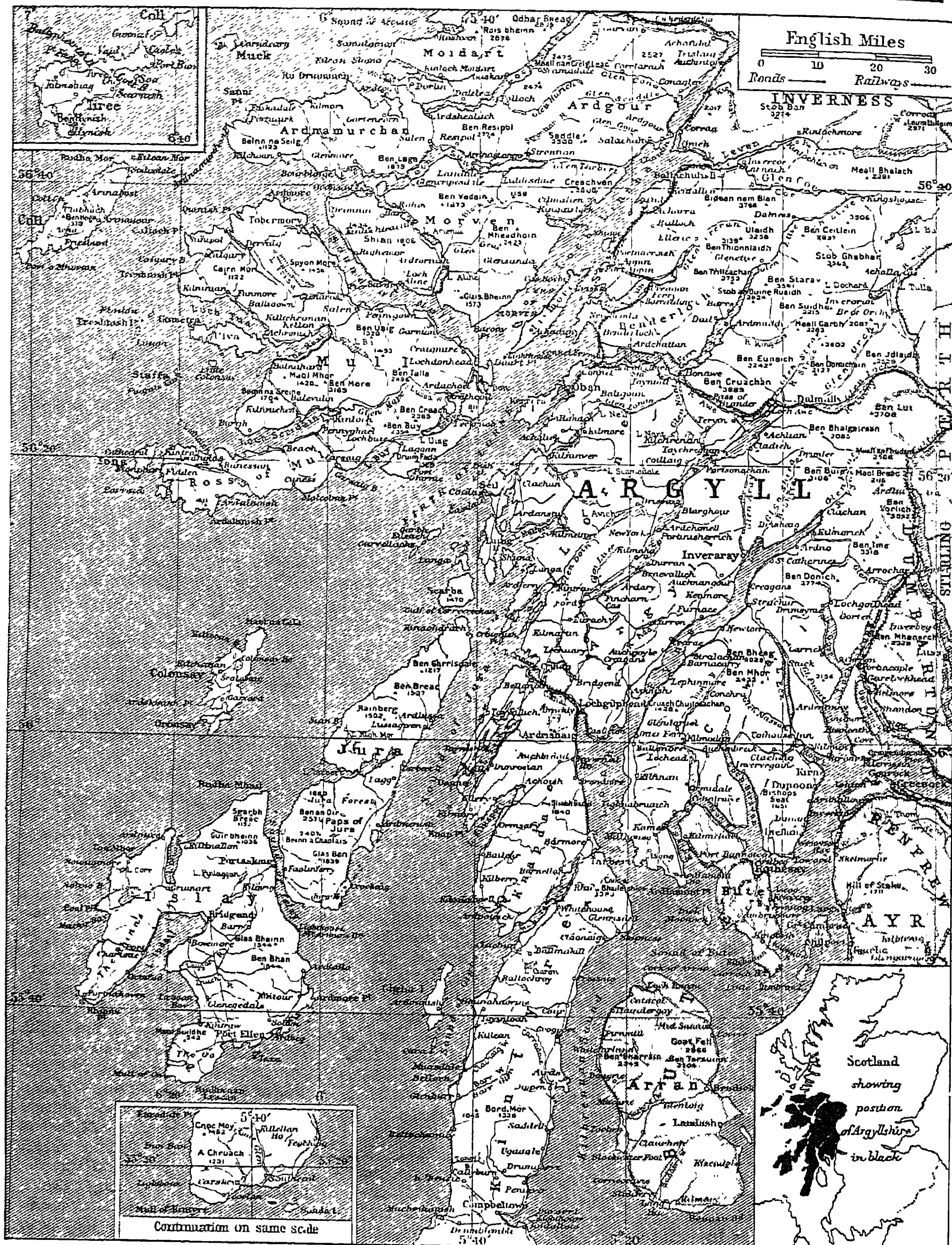
**Argyll and Sutherland Highlanders.** Kilted regiment, a union of the old 91st (Argyllshire Highlanders) and the 93rd (Sutherland Highlanders). The former was raised in 1794 by the duke of Argyll, and the latter by the earl of Sutherland in 1800. The old 91st specially distinguished itself in the Peninsular War, and formed part of the rearguard at Corunna. The 93rd won renown at the Alma and Balaklava. A detachment of the 91st was on board the *Birkenhead* when she was wrecked in 1852. The regiment bore an honourable part in quelling the Indian Mutiny, and in the S. African and the two Great Wars. A battalion formed the rearguard for the withdrawal to Singapore from Malaya, 1942. Other battalions served in Tunisia, notably at Longstop Ridge, April, 1943, and with the B.L.A., crossing the Rhine with the Highland division (*q.v.*).

**Argyll Rooms.** Fashionable London pleasure resort in the early part of the 19th century. Originally a large house in Little Argyll Street, London, W., it was bought by a Colonel Greville and converted into a place of public entertainment, where masquerades, balls,



A. and S. Highlanders' badge





Argyllshire. Map of the westernmost county of Scotland. Ardnamurchan Point in this county is the most westerly portion of the mainland of Britain. The county is cut up by many lochs and bays into peninsulas and islands

and concerts took place. Rebuilt by John Nash, the premises were burnt down while in the occupation of M. Chabert, known as "the fire king," Feb. 5-6, 1830.

**Argyllshire.** Western maritime and second largest co. of Scotland.

It includes most islands of the Inner Hebrides, the principal being Mull, Islay, Jura, Tiree, Coll, Lismore, Colonsay, and the small and picturesque islands of Iona and Staffa. Its greatest length is 114 m., extreme breadth 55 m., and

area 3,110 sq. m. The co. is served by the Scottish Region of British Railways, and by the Crinan Canal, which connects Loch Fyne with the Sound of Jura. The coast measures more than 2,000 m. and is broken by

many sea-lochs (Linnhe, Fyne, Moidart, Sunart, Long) and land projections (Ardnamurchan, Morven, Kintyre).

The surface is generally rugged and mountainous (Bidean nam Bian 3,766 ft., Ben Cruachan 3,689 ft., Stob Ghabhar 3,565 ft., Ben Ime 3,318 ft., Ben More 3,169 ft.), with low-lying coast districts. Loch Awe is the largest lake, and the chief streams, short, rapid, and unnavigable, are the Orchy and Awe. Sheep and cattle rearing and herring and salmon fishing mainly engage industrial attention less than 10 p.c. of the land being under cultivation. Slate is quarried at Easdale and Ballachulish, coal is worked near Campbeltown, and granite and limestone are also found. Strontian was formerly noted for its lead mines. In Islay and at Campbeltown there are whisky distilleries, and Kinlochleven has a large aluminium works. Inveraray is the co. town: Campbeltown, Dunoon, Oban, Lochgilphead, and Tobermory are next in importance. Argyllshire is a co. constituency. Pop. (1951) 63,270.

**Argyrokastron** (Albanian, Gjinokaster). Town of Albania. Called Ergeri or Ergi by the Turks when it formed part of the vilayet of Janina, it is an important centre of N. Epirus. It lies about 50 m. N.W. of Janina, on the E. declivity of the Acroceraunian Mts. on a tributary of the Vijose. It is noted for its snuff. It was occupied by the Greeks in 1916, and later by the Italians. During the Italo-Greek war (1940-41) the town became the main Italian forward base in South Albania, but was captured by the Greeks on Dec. 8, 1940. But they withdrew when Greece was invaded by the Germans in April, 1941; and only in 1944, when the Germans abandoned their hold upon Albania, was Argyrokastron freed. Pop. 10,836, mostly Greeks.

**Ariadne**. In Greek mythology, the daughter of Minos, king of Crete. Theseus, on his arrival in Crete with the tribute of young men and maidens to be devoured by the Minotaur, was shown by Ariadne how to find his way out of the labyrinth, the monster's dwelling-place, by means of a ball of thread. He took Ariadne away with him, but deserted her on the island of Naxos while she slept. Here the god Dionysus (Bacchus) took her to wife, and set her crown among the stars; or took her away by force from Theseus when they landed. In Homer, Ariadne was killed by Artemis on her arrival at

Naxos; in another account, she slew herself when abandoned by Theseus. Ariadne was a nature goddess, whose desertion by Theseus and marriage to Dionysus may symbolise the death and revival of vegetation in winter and spring respectively.

**Aria Form**. Term applied to music constructed after the formula A-B-A. A represents one section more or less complete in itself, sometimes repeated; B is a new section, for contrast; and a recapitulation of A, entire or modified, completes the aria. This form, in embryo, is found in popular airs such as "Charlie is my darling."

**Ariana** OR ARYANA. Ancient division of Asia. In the widest sense it comprised the territory peopled by Aryans lying between the Tigris on the W. and the Indus on the E.

**Arianism**. Name given to the doctrine, maintained by Arius in the 4th century, denying that Christ was equal to or was of the same substance with God the Father. The doctrine may be traced to the teaching of Paul of Samosata, but was first systematised by Arius, a priest of Alexandria, and Athanasius was its great opponent.

The controversy had become acute by 323, and in 325 the Council of Nicaea condemned Arius and formulated the earliest published declaration of the Catholic Faith—the Nicene Creed, in which the decision of the Council is to be found, with a few verbal differences, down to the words "in the Holy Ghost." All the bishops but two subscribed to the decision. Eusebius of Nicomedia subscribed, but altered the (Greek) word *homo-ousion* = of one substance with, into *homoi-ousion* = of a similar substance. Words of anathema were added to the declaration.

But Arianism was not extinguished. It was in the ascendant even under Constantius II (reigned 337-361) and Valens (364-378), but, Theodosius I declaring for Athanasianism, the second great council of the Church, held at Constantinople, 381, restored the authority of its predecessor of 325. Divided among themselves, the Arians declined in numbers and influence within the Roman empire. Meanwhile, however, the heresy spread among the West Goths, whose adoption of Arianism was one of the conditions of their settlement in Thrace; the East Goths in Italy, the Vandals in Africa, the Suevi in Spain, the Burgundians in Gaul,

and the Lombards in Upper Italy, until its fate was sealed by the triumph of the Franks under Clovis, who was baptized at Reims in 496. It reappeared in Europe in the 16th century in Poland, and in England from Henry VIII to James I there were executions for Arianism. Today it may be traced in the forms of Unitarianism, Socinianism, and Deism. Arianism was not compatible with the doctrines of the Trinity and the divinity of Christ. See Arius; Athanasius.

**Ariano Irpino**. Town and episcopal see of Italy, in Avellino province. It stands among the Apennines, 17 m. E.N.E. of Benevento, and deals in hemp, linen, pottery, oil, wines, and cereals. It has spinning mills and alcohol factories, and there are gypsum mines in the neighbourhood. Pop. (1951) 26,988. The town was formerly called Ariano di Puglia.

**Arica**. Northernmost seaport of Chile. In Tarapaca prov., 39 m. by rly. S. of Tacna in Peru, it is the terminus of the rly. across the Andes to La Paz, of which it is chief port of entry. Taken by Chile from Peru in 1880, it was long the subject of dispute, but Chilean possession was amicably confirmed, on the arbitration of the U.S., by an agreement at Lima, 1929. Exports include copper, silver, gold, iron, salt, sulphur, guano, borax. Pop. (est.) 30,000.

**Arichat**. Seaport of Nova Scotia, Canada. The capital of Richmond county, and the seat of a R.C. bishop, it stands on the S. side of Madame Island.

**Aricia**. One of the oldest cities of Latium, standing on the Appian Way, 16 m. S.E. of Rome. Opposing Rome, it was conquered by C. Maenius in 338 B.C., being subsequently granted full rights of citizenship. The modern town of Ariccia lies to the N.

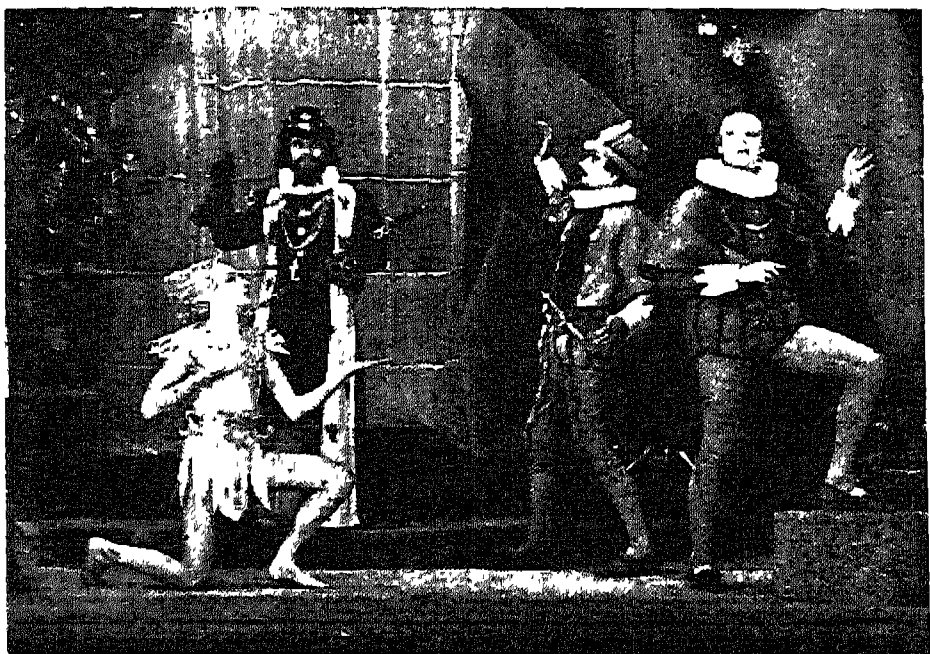
**Ariège**. A department of S. France. It is bordered on the S. by the Pyrenees, of which it includes some of the highest peaks, and is watered by the Ariège and the Salat. Agriculture, the cultivation of the vine, and the mining of iron and other minerals are the chief industries. Foix is the capital. The area is 1,892 sq. m. Pop. (1954) 140,010.

**Ariel**. Dainty sprite who waits on Prospero's commands in Shakespeare's comedy *The Tempest*. Although the name is of Hebrew origin, Ariel is the delicate, gossamer-winged fairy of English folk tales. Throughout the play Ariel voices a longing for freedom and at last is restored to



the liberty of the unchartered elements. Shakespeare gives Ariel three exquisite fairy songs: Come unto these yellow sands, Full fathom five thy father lies, and Where the bee sucks, there suck I. In Milton's *Paradise Lost* (vi, 371) Ariel is one of the fallen angels, and in Pope's *Rape of the Lock* a sort of fairy lady's-maid to Belinda. *See* *Tempest*, *The*.

**Ariel.** Man of Moab whose two sons were slain by Benaiah, son of Jehoiada (2 Sam. 23 : 1 Chron. 11,



Ariel casts a spell at the bidding of Prospero. Dennis Hutchinson as Shakespeare's dainty sprite in a Stratford-on-Avon production of *The Tempest*, 1938

R.V.). The name occurs on the Moabite stone in allusion to an altar, is used as the name of a man in Ezra 8, and applied symbolically to Jerusalem in Isaiah 29, and in the Hebrew of Ezek. 43 to the altar of burnt offerings. The word means lion, or altar, of God.

**Aries** (Lat., ram). One of the twelve signs of the Zodiac. Through it the sun passes on its annual round, and it was associated in Greek mythology with the voyage of the Argonauts in search of the Golden Fleece. Aries is an important but small constellation close below the greater W that lies beneath the smaller W of Cassiopeia's Chair. It can also be found by following the stars which mark the belt of Andromeda. The only bright stars in the constellation—usually known by their Arabic names—are the three on the Ram's head. Alpha is known as Hamal, which is Arabic for Ram, and Beta and Gamma bear the names Sheratin, the two signs, and Mesartin, the two attendants. The "first point of Aries" is the point of the heavens at which the sun annually crosses the Equator at the vernal equinox. Owing to the precession of the equinoxes, this point is now actually in the constellation Pisces, but is still conventionally called the first point of Aries. *See* *Zodiac*; *Precession*.

**Arietta** (Ital., little aria). In music, a short and less important

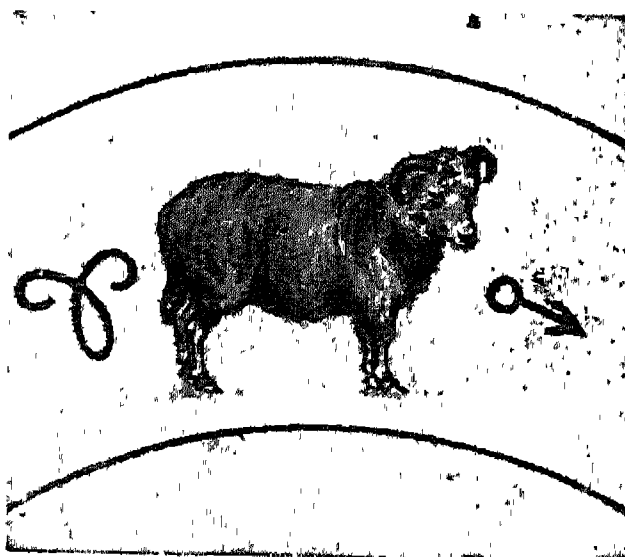
aria, frequently without definite second and third sections. *See* *Aria*.

**Aril** (late Latin *arillus*, dried grape). Flethy coating to certain seeds, arising from the placenta. The best examples are found in the "mace" that encompasses the nutmeg, and the orange-coloured wrapping of the seed that helps to make opened seed-vessels of the spindle-tree so conspicuous.

**Arimaspi.** Mythical people of Scythia. They are referred to by Herodotus (iv, 13, 27) as dwelling to the E. of the Caspian Sea. Pausanias describes them as all one-eyed men from birth, constantly at war with the griffins guarding the gold of the river Arimaspius, probably in the Altai district of Russia. Aeschylus makes them inhabitants of Africa. *Cf.* Milton, *Paradise Lost*, ii, 943: The Arimaspi, who by stealth Had from his [the griffin's] wakeful custody purloined The guarded gold.

**Arinos.** A river of Brazil. It rises in the Arinos plateau of Matto Grosso, and flows nearly 700 m. N.N.W. to join the Tapajos, tributary of the Amazon.

**Ariosto, LUDOVICO** (1474-1533). Italian poet. Born Sept. 8, 1474, at Reggio, of an ancient and noble Bolognese family, Ariosto devoted five years to the study of jurisprudence, which he abandoned on discovering his vocation for poetry. In 1503 he became one of the attendant gentlemen to Cardinal Ippolito d'Este. He neither neglected his duties nor abandoned his poetry, and after ten years completed 24 cantos of the epic poem that brought him fame, the *Orlando Furioso*, first published in 1516 and designed as a sequel to Boiardo's *Orlando Innamorato*. In the third



Aries, or the Ram, one of the twelve signs of the Zodiac

edition (Ferrara, 1532) the poem appeared in an enlarged form and assumed its final proportions. His other writings include five comedies and some graceful sonnets.

After serving the cardinal faithfully for 14 years Ariosto was dismissed without further reward, but soon after joined the household of the cardinal's brother Alfonso, duke of Este. In 1522 the poet undertook, with success, to quell a rebellion in the Garfagnana province, of which he later became governor, but after three years returned to Ferrara. He died June 6, 1533, and was buried in the Church of San Benedetto, Ferrara, where a handsome monument was erected to his memory. Eng. translations of the *Orlando*: Sir J. Harington, 1591; T. H. Croker, 1755; W. Huggins, 1757; J. Hoole, 1773-83; W. S. Rose, 1823-31. *See* *The King of Court Poets*, E. G. Gardner, 1906; *Life and Genius of Ariosto*, J. S. Nicholson, 1914.

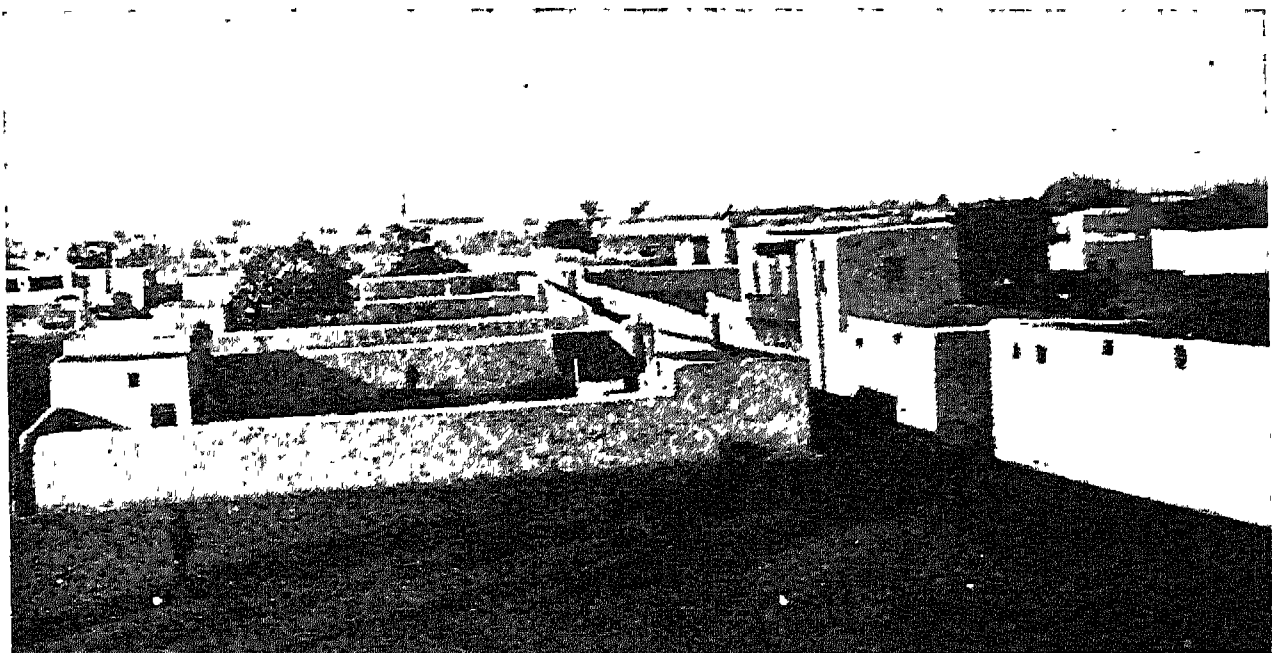


Ludovico Ariosto  
Portrait by Titian

**Ariovistus.** A German chief, mentioned in Caesar's *Gallie War*. In 61 B.C. he crossed the Rhine with his followers to help the Sequani against the Aedui, whom he defeated. He received in return Sequanian territory in Alsace, but continued his attacks on the Gauls. The Aedui begged Caesar for help and in 58 B.C. Caesar advanced into Alsace and defeated Ariovistus, driving him back across the Rhine.

**Arisaig.** District of Inverness-shire, Scotland. It lies between Lochs Ailort and Morar, and is partly covered by a deer forest. The village of Arisaig is 34 m. N.W. of Fort William. Pop. (1951), with Moidart, 1,002.

**Arish, EL.** Harbour of Egypt. It stands on the Mediterranean, about 50 m. S.W. of Gaza and is on the caravan route from



Arish. View of the Egyptian town as seen from the S.E. From here in the First Great War the British constructed a railway into Palestine

Beersheba to Egypt. It was taken by Napoleon in 1799 and during the First Great War was occupied by the Turks, from whom it was captured by the British on Dec. 21, 1916. The advance of the British troops was facilitated by the construction of a rly. to this point, since extended over the Palestine border and as far as Haifa.

**Arista**, MARIANO (1802-1855). Mexican general. Born at San Luis Potosí, July 26, 1802, in 1846 he took command of the Mexican army of the north in the war with the U.S.A., but, being defeated at Palo Alto (May 8) and Resaca de la Palma (May 9), he was recalled. War minister in 1848, he was president of Mexico in 1851-53, and, resigning, was banished to Europe. He died at sea, Aug. 7, 1855.

**Aristaeus**. In Greek mythology, son of Apollo and the nymph Cyrene. He was the protector of flocks and herds, of shepherds, and of vine and olive plantations. In Virgil's *Georgics* (iv) he is connected with the story of Orpheus and Eurydice (*q.v.*).

**Aristagoras** (d. 497 B.C.). Tyrant of Miletus in Caria. He persuaded Darius, king of Persia, to aid him in an attack on Naxos, but the expedition miscarried. Fearing the wrath of Darius, who hoped to obtain possession of the island, Aristagoras stirred up the Greek cities of Asia Minor to revolt against Persia. Having obtained aid from the Athenians, the combined forces marched on Sardes, which was captured and burnt. Unable to hold the city, the Greeks, deserted by the Athenians, were forced to retreat to the coast, and their cities passed again under Persian rule. Aristagoras fled to Thrace, where he was killed shortly afterwards while fighting against the wild tribes of the country.

**Aristarchus** OF SAMOTHRACE (c. 220-145 B.C.). An Alexandrian grammarian and critic. He was a pupil of the grammarian Aristo-

phanes of Byzantium at Alexandria, where he founded a critical and grammatical school and superintended the education of the children of Ptolemy VI Philometor. When his pupil, Ptolemy Physcon, who had usurped the throne, began to persecute men of learning, Aristarchus fled to Cyprus, where he is said to have starved himself to death.

He devoted his labours to the explanation and restoration of the text of the most important Greek poets. His great work was his recension of the *Iliad* and *Odyssey*, which is the basis of all subsequent texts. In this he made use of critical marks to indicate spurious or interpolated passages.

**Aristarchus** OF SAMOS. Greek astronomer, who lived in the third century B.C. He is said to have been the first to state that the earth moved round the sun.

**Aristeas** (c. 550 B.C.). Greek poet. A native of the island of Proconnesus. His poem, *Arimaspeia*, contained an account of his travels on the north coast of the Black Sea and of the Arimaspi (*q.v.*) and other similarly fabulous peoples.

**Aristeides** OR ARISTIDES (c. 550-467 B.C.). An Athenian general and statesman, surnamed the Just. After the first Persian War, in which he fought with distinction at Marathon, he opposed the policy of Themistocles, who regarded the creation of a fleet as the best bulwark against Persian aggression. The differences between them became so acute that in 483 ostracism (*q.v.*) was resorted to, as a result of which Aristeides had to go into exile. He did good service, however, in the second Persian War, with a force raised by himself privately, and in 479 commanded the Athenians at the battle of Plataea. When, owing to the arrogance of Pausanias, the states of Greece, which had formerly

looked to Sparta as their leader, transferred their allegiance to Athens, and the Delian league was formed, Aristeides was chosen to organize the league, and to determine the contribution of each state. In domestic politics, though an aristocrat by birth, Aristeides, recognizing that the spirit of the times demanded it, was responsible for the further democratisation of the Athenian state. He improved the political status of the *Thetes*, the fourth and lowest class of citizens, and was in favour of admitting all classes to the archonship. In 467 he died in such poverty that there was not enough money to pay for his funeral.

**Aristeides** OR ARISTIDES (fl. 360-330 B.C.). Greek painter. A native of Thebes, he excelled in the rendering of expression and emotion, though his colouring is said to have been rather harsh. His most famous picture represented a mother suckling her child though mortally wounded, her face depicting her anguish lest the infant should draw blood instead of milk. Attalus, king of Pergamum, paid 100 talents (£20,000) for one of his pictures.

**Aristeides** OR ARISTIDES (2nd century B.C.). Greek writer. He was the author of *Milesiaca*, scenes of Milesian life, which, translated into Latin, was very popular among the Romans.

**Aristeides** OR ARISTIDES, PUBLIUS AELIUS (c. A.D. 129-189). A Greek rhetorician, born in Mysia. Trained by famous rhetoricians and literary men, he travelled and lectured. The citizens of Smyrna owed to him the rebuilding of their city after its devastation by an earthquake, the result of an appeal to his friend, the emperor Marcus Aurelius. Aristeides' extant works consist of two treatises on rhetoric and a number of speeches.

**Aristippus** (c. 435-360 B.C.). Greek philosopher. A native of Cyrene, he was the founder of a school of philosophy, hence called Cyrenaic. He taught that happiness was to be found in the enjoyment of the present, to the neglect of all considerations of the past or the future, but that for the truest enjoyment of what lay to hand the cultivation of wisdom was essential. The doctrines of Epicurus were a development of this teaching. Aristippus was one of the pupils of Socrates and was the first to seek payment for his teaching. See *Cyrenaics*.

**Aristochin**. Tasteless form of quinine. Chemically carbonyl quinine, it is made by acting on quinine with phosgene gas. See *Quinine*.



**Aristocracy** (Greek *aristos*, best; *kratos*, government). Term meaning originally the rule of the best men. Today, however, it is used in a somewhat different sense, meaning not a system of government, but a class of men and women distinguished from their fellows by superior birth or position. By an extension such terms as aristocracy of intellect and aristocracy of wealth are used.

In its older sense the word was used by Aristotle to define one of three forms of good government: monarchy, aristocracy, republic. He contrasted aristocracy with oligarchy; both mean the rule of the few, but in one the few rule solely with regard to the public welfare, and in the other they do not. Government by an aristocracy has been fairly common in the history of the world, although perhaps it would be more correct to describe most of such governments as oligarchies; they were certainly the rule of the few, but it is questionable whether they were the rule of the best. Some of the city states of ancient Greece,

especially Sparta, perhaps enjoyed the nearest approach to real aristocratic government known, but that of Venice was an oligarchy. An aristocratic government may be also the rule of a single man, provided that man is the best man—for instance, the philosopher king of Plato's Republic. The 19th-century antithesis in the popular mind between aristocracy and democracy, government by the few against government by the many, has in the 20th century been overshadowed by the antithesis between parliamentary government and new forms of dictatorship.

**Aristogiton.** Friend of Harmodius (*q.v.*).

**Aristolochia** (Gr. *aristos*, best; *locheia*, childbirth). Large genus of shrubs and perennial herbs. It includes about 300 species, chiefly natives of tropical regions, especially S. America. Birthwort (*A. clematitis*) is European and, having in the past been cultivated for medicinal use, has long been naturalised in England. It has heart-shaped leaves and yellow flowers.

Dutchman's Pipe (*A. sipho*) is a N. American climbing shrub, with yellow-brown flowers the shape of which has suggested the popular name. Snake-root (*A. serpentina*) has a reputation as



*Aristolochia clematitis*, or Birthwort

a cure for snake-bite in America.

**Aristolochiaceae.** Dicotyledonous family of climbing shrubs and herbs of tropical and warm temperate regions of the world except Australia. They have irregular flowers consisting of a dull-coloured calyx with 6 to 36 stamens and a solitary pistil. The lower part of the flower is inflated, and this portion in some species acts as a trap for flies, which are made use of as agents in cross-fertilisation. The two principal genera are *Aristolochia* (Birthwort) and *Asarum* (see Asarabacca).

**Aristophanes** (c. 445–385 B.C.). Athenian dramatist. A supreme comic genius, he was born in Athens. He lived for a time and owned property in Aegina, which gave his rivals opportunity to call him a foreigner. Fifty-four comedies in all were attributed to him, 11 of which survive. His first comedy was produced in 427 B.C., and the second edition of the *Plutus* (considered the link between the Old Comedy and the New of Menander) in 388. He was conservative in his ideas, the Athens of the Persian Wars being his golden age. The newer Athens was distasteful to him; he disliked the growth of democracy and the rationalistic attitude towards religion and morals associated with the Sophists.

His earlier comedies, such as *Hippes* (the knights), *Nephelai* (the clouds), and *Sphekes* (the wasps) contain most violent personal attacks upon those who in his eyes stood for the tendencies he deplored, especially the demagogue Cleon and the philosopher Socrates, whom he unjustly identified with the Sophists. Cleon tried unsuccessfully in the law courts to call in question the citizenship of Aristophanes, who appears to have learned caution, for his plays during the next period of his dramatic career, such as *Ornithes* (the birds) and *Batrachoi* (the frogs).



Aristides (c. 550–467 B.C.) accosted by a peasant who, not knowing him, wished him to write the name of Aristides as one to be ostracised—because he was tired of hearing him called The Just. See p. 585

After a painting by E. E. Hillemacher, Dijon Museum

in the second of which Euripides is held up to ridicule, were much less outspoken, while in his last personal satire almost disappeared.



Aristophanes,  
Greek dramatist  
Capitol, Rome

the Old Comedy as contrasted with the Middle and the New

Many comedies derived their names from the creatures which the chorus were dressed up to represent, e.g. *The Wasps*, *The Birds*, *The Frogs*. Aristophanes is the chief representative of what was known as

In spite of his strong political convictions, Aristophanes lacks any constructive notions of his own. He is primarily a comedian. Though many of his allusions are unintelligible owing to our ignorance of contemporary conditions, his work can be appreciated and enjoyed by the modern reader. His humour is irresistible and his wit unfailingly brilliant. Not only was he a supreme comic genius; for beauty and delicate fancy some of his lyrical passages challenge comparison with those of Shakespeare. There is a spirited English verse translation by B. B. Rogers, Loeb Classical Library, 1924. *Consult* Aristophanes, Gilbert Murray, 1933; *The People of Aristophanes*, V. Ehrenburg, 1943.

for his province, and by dint of sheer assimilative capacity, coupled with scientific insight, presents to the world a veritable encyclopedia of science, learning and philosophy.

Most of the works ascribed to Aristotle have perished. Among the lost books are letters, speeches, poems, philosophical dialogues, treatises on national festivals and dramatic contests, and manuals of natural history and rhetoric. It is on these lost works that Aristotle's fame as an accomplished stylist was founded. What has survived are not his highly finished literary efforts, but lectures and treatises of a technical and academic order. Intermediate between the two classes is *The Constitution of Athens*, one of 158 similar surveys published in 1891 from a papyrus found in Egypt. Altogether the extant works, though forming not more than a fifth of the total output, serve to indicate the amazing range of the author in virtue of which Dante might well salute the Stagirite as the "master of those who know."

#### The Theory of Teleology

The large portion of the *corpus* occupied by works on natural science and natural history, now covered by the special sciences of astronomy and the like, suffers from the limitations of all early research. Even so the three works, *The History of Animals*, *On the Parts of Animals*, and *On the Generation of Animals*, have elicited from the greatest scientists unstinted praise. Of crucial importance is the theory of teleology, expounded most fully in *De Anima*. There Aristotle asserts that not only human life, but animal and plant life also, are dominated by a soul dwelling in every creature, preserving the material body from decay and determining its growth towards completion. This principle, appearing at its highest in man as mind, is the form, and efficient cause, and end of the physical organism, and by this principle Aristotle was able to explain organic life and growth everywhere as a development from the merely potential to the actual. Such a point of view anticipates modern inquiries into purposive forms of life, and links up with evolutionary ideas in general. Again, as a master of classification and an acute observer, Aristotle reveals prodigious ability in this sphere.

Of the six works collected by a later hand in the *Organon*, the *Prior Analytics* shaped once for all the doctrine of the syllogism, while the *Posterior Analytics* expounded the nature of exact or

## ARISTOTLE: THE FATHER OF LEARNING

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*This sketch of the life and work of the great Greek scholar is a necessary preliminary to the study of many of the great branches of learning.*

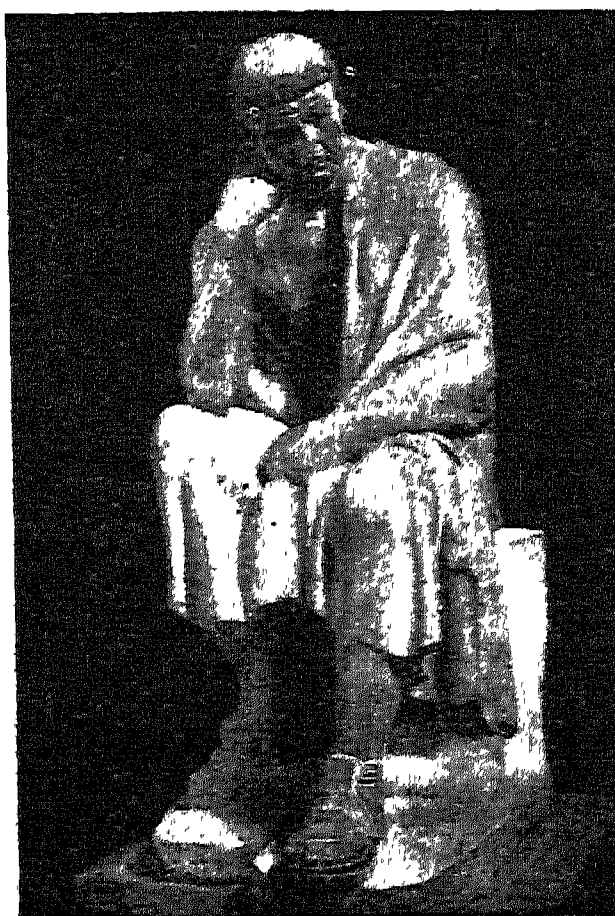
*See Ethics; Logic; Metaphysics; Philosophy, etc.*

Aristotle, the Greek philosopher (384-322 B.C.), was born at Stagira in Macedonia. His father Nicomachus was physician to Amyntas II, grandfather of Alexander the Great. In 367 Aristotle went to Athens and spent 17 years in association with Plato. Several years of adventure in Mysia followed, including a romantic marriage. In 343 he was called to Macedonia by Philip to undertake the education of his son, then a boy of fourteen. A college was built, and for seven years, with interruptions, the profoundest intellect of the age was occupied with the training of the supreme man of action. When Alexander, in 334, passed into Asia "to subdue the world," Aristotle returned to Athens, founded his Peripatetic School at the Lyceum, and there, supported by gifts from his royal friend, lived for the next twelve years absorbed in lecturing and scientific research. In 323 death removed his protector and, mindful of the fate of Socrates, he retired to Euboea to spend the last months of his life in peace, declaring that Athens must not sin a second time against philosophy.

#### Aristotle and Plato

Platonism forms the background of Aristotle's thought. Like Plato, he views the universe as a system of particular things capable of being grouped according to kinds or species, each endowed with a nature that can be known. This nature is for Aristotle, as for Plato, not particular but universal, but the tendency in the master to affirm the superior reality of

universals or ideas against the multitude of particulars is modified in the pupil by his strong scientific and biological leanings. In Aristotle the conviction that ideas have no existence apart from



Aristotle, Greek philosopher who took all knowledge for his province  
Statue in Spada Palace, Rome

things leads him to wage war against the supra-sensual ideas of the Platonists, while it stimulated his passion for exact and comprehensive observation. In every department of scientific inquiry he seeks to determine the facts, to register and classify the results, disposing of them in such a way that they reveal their true character and form the materials out of which higher generalisations may emerge. In such a spirit he takes the whole circle of knowledge



demonstrative science. On these rests the fame of Aristotle as the inventor of formal or, if the importance of the syllogism be accentuated, deductive logic. It was as a rival to the *Organon* that Bacon wrote his *Novum Organum*, thus earning the title of the inventor of inductive logic. Bacon professes to supply a theory or method of scientific discovery, whereas Aristotle, although he explicitly subordinates his theory of the syllogism to the wider problem of the nature of scientific inquiry, lays too much stress relatively on the form in which the results of discovery are set forth.

#### Aristotle's Poetics and Rhetoric

The *Poetics* not merely contains valuable information about the origin of tragedy, it lays the foundation of modern aesthetic. Unlike Plato, Aristotle makes the imitative character of poetry and art no reproach against their claim to be a valuable function of life, but rests upon that character the special capacity of all the arts to achieve their proper ends. That end is, in each case, the worthy employment of leisure, or true recreation, which is further defined in connexion with tragedy as the purgation of the emotions. By a flash of genius he divines the serious function of high art, and leaves to future criticism the task of developing the fertile suggestion thus thrown off. From the suggestion of idealising imitation the theory of the symbolic in art has evolved. In this difficult region Aristotle again is the starting-point for later investigation.

The same talents, combined with his sure and cultured taste, have made his three books on *Rhetoric* a classic. The main theme is oratory, treated as the art of producing conviction by persuasive speech. There are admirable sections on the emotions and how to control them, and on types of character, besides much refined criticism of diction and figurative speech. The fruits of his omnivorous reading are lavishly used and, if his neglect of lyric poetry throughout argues undue intellectualism in his mental make-up, he leaves a deep impression of broad and quick artistic sympathies.

In the *Ethics* and the *Politics* Aristotle analyses the Hellenic moral and political order, pronouncing it, with reservations, good. The supreme end is happiness, defined as an activity of the soul in accordance with virtue in a sufficiently long life. The external conditions of happiness having been briefly sketched, the *Ethics* pro-

ceeds to elaborate the morality of the Hellenic citizen, concluding with an attempt to bring the inner life so described into relation with the world of affairs. In opposition to the Stoics, Aristotle contended that external goods, environment generally, are not indifferent. Not negation but subordination is his maxim here. At the highest the good life will make every good thing serve its purpose. On the other hand he allows large scope to the capacity of virtue to rise superior even to hostile surroundings. In the *Politics*, while still remote from the Christian view which approves hardship as a condition for the promotion of virtue, he makes the striking concession to the good life that it may make a noble use of poverty and disease itself.

True to his governing principle of the mean, he rejects all extreme social and political programmes. He defends the family, and even justifies slavery in cases where the free citizen is of a superior race; he rejects communism and prefers aristocracy to either extreme of monarchy or democracy. A mixed constitution is best of all, and is most secure against civil strife, the bane of the Hellenic state. His plan of education is conceived in the most liberal spirit, and does full justice to the claims of disinterested culture as well as to the more obvious practical needs.

Among essays in the higher logic the *Metaphysics* is almost without a rival. Its subject is Being, not of a particular kind, but Being as such. How the universe of our experience, composed of a multitude of individuals and species, exposed to constant change, can form the subject of one science is a problem. In face of the difficulty Aristotle is assured that the Being or Essence of which every thing is a manifestation does present a proper object for treatment by a supreme science, which he calls first philosophy. This Being is alleged to be the only thing possessing reality by itself, and to it all other forms of being are referred.

#### The Immanence of Ideas

Thus, in spite of his emphatic denial of the independent existence of universals, and despite the prior reality which he claims for the individual, he recurs to the theory of Being or Essence as the first cause of every particular existence. In the particular he discerns, on a last analysis, four causes—material, formal, efficient, and final, but these are precisely what in combination constitute the object, converting the potential existence into the actual thing. As the appropriate

object of our highest knowledge this first essence is that which is most real: it is apprehended by mind, and ultimately is identified by Aristotle with God. Consult Greek text in e.g. Teubner or Loeb classical series; standard Eng. trans. pub. by O.U.P.; numerous other translations.

**Arithmetic** (Greek *arithmos*, number). The science of numbers. The primitive operation of arithmetic is counting; the process of addition affords a rapid and convenient method of counting, while the inverse operation, subtraction, may be regarded as a short method of counting backwards. Multiplication is a contracted form of addition, and division a contracted form of subtraction. Addition, subtraction, multiplication, and division make up the four fundamental rules of arithmetic. The concept of fractions is based on that of division. The invention of logarithms and the slide rule greatly simplified complicated arithmetical calculations.

Arithmetic, by its simplification of the operation of counting and the derived process of measurement, gives us a firm grip on the real physical world and reduces our vague ideas of number and quantity to precise form. It is of cardinal importance in commerce, government, war, and science, and in the business of life generally.

The development of arithmetic was long hampered by lack of a suitable notation. The number which in the present Arabic notation is written 888 was written by 3 letters ( $\omega'$   $\pi'$   $\eta'$ ) in Greek, and 12 (DCCCLXXXVIII) in Roman, notation. The inconvenience of the Roman notation for arithmetical work is immediately obvious. In Greek notation one letter stands for eight hundred, another for eighty, a third for eight. In Arabic notation the symbol 8 signifies eight or eighty or eight hundred according to its position in the group of figures. The invention of the symbol 0 in the Arabic system was of decisive importance; it made possible discrimination between, e.g., 88 and 808. This simple idea of ascribing values to the symbols dependent on their relative positions produced a system which combines economy in the number of fundamental symbols required with compactness. The medieval invention of decimals to represent fractions (e.g. 1.7 for  $1\frac{7}{10}$ ) substantially increased the flexibility of the Arabic system.

